

Guest Editorial

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Sustainable buildings, pro-environmental behaviour and building occupants: A challenge or an opportunity?

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As climate change, sustainability and corporate social responsibility are increasingly omnipresent in the media, the policy arena, organisational agendas and individuals' minds, the property sector has to play its role by delivering buildings with low environmental impact. While a number of technological and design solutions can be exploited to deliver low- or zero-impact buildings, the role of occupant behaviour in the building's performance is often considered in an implicit and simplistic manner. Yet building designers and engineers are becoming increasingly aware that even award-winning sustainable designs can fail to deliver the anticipated energy savings and carbon reductions. The Carbonbuzz initiative, for example, found that actual CO₂ emissions in the retail sector can be up to double those anticipated at the design stage (www.carbonbuzz.org). While these discrepancies can be partly attributed to inconsistencies in the calculation methods, incorrect assumptions on occupant behaviours also play an important role. Any building design is, after all, reliant upon assumptions on occupant behaviours, which are often based on a generic and simplistic understanding of occupants' psychology and needs. There is plenty of anecdotal evidence and well-documented case studies demonstrating that unhappy occupants will override building controls and compromise its environmental design philosophy, thus resulting in energy wastage and financial losses. The Carbon Trust estimates that energy costs in existing buildings can be reduced by 10–20 per cent through simple actions, many of which are relevant to occupant behaviour (Carbon Trust, 2006). The relationship between occupant behaviour, building design and building performance is, however, complex. For instance, a recent study of two office buildings in Australia found that occupant satisfaction levels are positively associated with environmental beliefs. In particular, occupants with higher levels of environmental concern were more tolerant of their building, especially those featuring aspects of green design, such as naturally ventilated façades and operable windows (Deuble and de Dear, 2010).

In the context of non-domestic buildings, the term 'occupant behaviour' mostly refers to the largest population group occupying the building, such as employees for office buildings, as well as customers for the retail and leisure industry. In the context of environmental sustainability, the links between customers' behaviour and the environmental impact of a company's products or services are important. However, this editorial mostly focuses on the role of customers and/or employees in the environmental performance of an organisation, for those behaviours affecting building performance (for example, energy consumption for heating, cooling and lighting) and support services (for example, waste and recycling). It is also important to acknowledge that in non-domestic buildings there are several 'types' of occupants whose 'behaviour' can affect the building's environmental impact. First, the organisation(s) owning or leasing the building will have an impact on its energy consumption, depending, for example, on occupancy patterns (for example, hours of operation needed for business requirements), which might greatly differ from the original design assumptions. In addition, the organisation's approach to sustainability and the environment could affect, for instance, the introduction and effectiveness of recycling and/or energy-saving campaigns. Landlords may also need to work in partnership with tenants to improve environmental impacts such as of energy use. Facility managers operating the building will also play an

important role, for example, by avoiding unnecessary energy use through optimisation of building controls or by changing thermostat settings. In most cases, however, any change to building design or operation needs to meet occupants' requirements for comfort, productivity, convenience and so on. Therefore, understanding, supporting or changing the behaviour of employees/customers is crucial.

Environmental psychology, sociology, occupational psychology and marketing can all play a role in understanding the drivers for pro-environmental behaviours. Kollmuss and Agyeman (2002) discuss the evolution of models of pro-environmental behaviour. Initial models were based on the relatively simple assumption that greater environmental knowledge and awareness would lead to a change in attitudes, which in turn would result in behaviour change. The authors highlight that, although this model is still used in many environmental campaigns, research shows that there is often a gap between attitude and behaviour. This is due to many factors, including methodological difficulties whereby the measured attitudes (for example, Do you care about the environment?) are much broader in scope than the measured activities (for example, Do you recycle?). Kollmuss and Agyeman also identify several factors and barriers affecting pro-environmental behaviour, which are divided into: external factors (for example, institutional/contextual, economic, social and cultural) and internal factors (for example, motivation, values, attitudes, environmental knowledge, locus of control and so on). Some of these factors are particularly important in the context of non-domestic buildings. For instance locus of control corresponds to an individual's perception about the ability to deliver change through one's behaviour. In many cases, occupants can feel that their actions have little or no impact, particularly in the case of complex buildings.

Even though the drivers and barriers for pro-environmental behaviour can be several and incredibly interrelated, a number of well-known intervention strategies have also been identified. These can be distinguished between informational and structural strategies (Steg and Vlek, 2009). Informational strategies address motivational factors (for example, perception, knowledge, norms) without changing the context in which choices are made. Some of these strategies can be effective if the target pro-environmental behaviour is relatively convenient and not very costly (in terms of money, effort, time and/or social disapproval). Structural strategies, on the other hand, can be more appropriate if the target behaviour is 'costly', in which case such strategies aim at changing contextual factors such as the availability, costs and/or benefits of behavioural alternatives. Davis and Challenger (2009) note that one of the most successful strategies for pro-environmental behaviour involves the use of feedback in interventions for energy reduction in the home. Although this strategy has resulted in practical applications with commercial opportunities (that is, smart metering), it is not yet widely applied to non-domestic settings. However, as Automatic Meter Readings (AMR) become more popular (AMR helps towards the requirements for the CRC's league table), this technology can provide the opportunity to systematically apply feedback strategies in the non-domestic sector. Another fairly successful and increasingly used strategy for behaviour change is an informational strategy that exploits social norms. This has been used in a number of projects on domestic energy, where energy reports are produced comparing individual households' energy use to that of neighbourhood averages. This can induce some households to reduce their energy use to be in line with their peers. An application of this strategy to the leisure sector is discussed by Goldstein et al (2008), who examined the effectiveness of signs requesting hotel guests to reuse their towels. The research showed that signs using descriptive norms (for example, 'the majority of guests reuse their towels') were more effective than generic appeals often used in this context (for example, 'Help save the environment'). The research also found that normative appeals referring to 'the guests in this room' resulted in greater compliance than those simply referring to 'hotel guests'.

Although some of the complex behaviour models might appear challenging when it comes to practical applications, creativity and ingenuity can play a role in behaviour change

interventions. For example, the Interactive Institute of Stockholm has produced a lamp that changes shape depending on the household's energy consumption. In addition, the Fun Theory is an initiative from Volkswagen, Sweden, which attempts to change behaviour by making it fun. For example, to encourage more people to recycle by using a bottle bank, the latter is turned into an 'arcade game', with sound effects and scores. While it is debatable whether some of these approaches are simply a 'green branding' exercise that may not produce lasting changes in behaviour, it is also apparent that behaviour change campaigns are not hugely dissimilar from marketing campaigns. The principles of community-based social marketing for sustainability involve (i) the identification of the target behaviour; (ii) the examination of barriers and motivations for those behaviours (including, if suitable, segmentation of the target audience); (iii) the development of an intervention strategy; (iv) pilot; (5) measurement and evaluation (McKenzie-Mohr, 2000). There are very few intervention projects that have attempted, in such a systematic manner, to induce pro-environmental behaviours in occupants of non-domestic buildings. However, the retail and leisure industry is potentially in a unique position, thanks to its knowledge of marketing and of its customers. In this context, collaboration with property professionals would be advantageous. The identification or development of suitable segmentation models would also be useful.

There is much scope for research in this area, where multidisciplinary teams of psychologists, building and environmental scientists, facility managers and marketing experts could collaborate to identify, design, implement and test interventions for pro-environmental behaviours in building occupants. Successful projects would not only deliver the desired reduction in environmental impacts, but are also most likely to bring financial savings to the companies involved, who would also be able demonstrate their corporate social responsibility credentials, and possibly establish themselves as 'green' market leaders. In this sense, changing occupant behaviour is not only a challenging, but also a promising opportunity.

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