

## Occupant Behaviour: “Do Occupants Matter?”

### How does your environment impact your health, happiness and productivity?

People typically spend more than 90% of their lives within buildings and there is growing realisation that the building design and HVAC services can significantly affect their health and wellbeing. For businesses, this is an important point as healthier and happier staff also tend to be more productive due to reduced absenteeism and increased staff retention.

Currently in the UK, there is a national problem with low productivity compared to other G7 countries. Increasing the productivity of staff by only a small proportion can produce financial savings many times larger than energy efficiency savings achieved through an efficiently designed and operated building. For businesses, staff costs (including salaries and benefits) and rent costs typically account for around 90% and 9% respectively of total annual operating costs. In comparison, energy costs typically represent just 1%. From a financial perspective then designers should focus more on improving the health, wellbeing, and productivity of the occupants.

In the past, there has been a tendency within the construction industry to focus on the technical performance of a building project, particularly by adhering to current industry standards, rather than the health and wellbeing of the occupants. For instance, increasing productivity was often tackled by increasing workplace density, and lighting provision was approached through only one metric; lux level, rather than considering other aspects such as the connection between natural light and people’s circadian rhythms.

Several recent industry publications, such as WGBC’s Health, Wellbeing & Productivity in Offices, as well as the development of the new Well Building Standard demonstrate the growing interest in this area of built environment design. Increasing the health, happiness and productivity of the building users can be approached through consideration of the four E’s – Element, Environment, Experience, and Economics, and how these aspects interact with one another. It is an important point that strategies intended to maximise the health, wellbeing and productivity of the occupants are often compatible with strategies to minimise energy consumption. For example, increasing natural daylight provision should reduce the need for artificial lighting.

Designing for improved health, happiness and productivity should be approached by making use of available research to inform the business case for particular design choices. For example, there is evidence to suggest that workers with windows sleep on average 46 minutes more than colleagues without windows each night. It is also crucial to monitor the experience of the occupants in our completed projects and feed these findings back to design teams to improve our future designs.

Richard Tetlow, AECOM, May 2016

### Key Issues & Considerations

- Health, happiness and productivity are not typically considered during the design process but can have highly significant financial implications for the lifetime of the project.
- Make health, happiness and productivity a key part of the design from the start of the project.
- Use available research to inform the business case for occupant related design decisions.
- Effective consideration of the occupants needs an integrated design team with ideally a wide range of experience and backgrounds – not just engineering.
- Collect data from completed projects related to the experience of the occupants and use this as the basis to improve future designs.

### Further Information

- [Health, Wellbeing & Productivity in Offices](#)
- [Well Building Standard](#)

## Prompting occupant behaviour

Occupant behaviour does matter, but to a greater or lesser extent depending on the function of the building and the amount of control opportunities the design affords to the occupants. In the past the misuse of control systems has led designers to regard the occupants as a nuisance whose ability to interact with building services should be severely limited. However, evidence suggests that restricting the amount of occupants' control over their environment can negatively impact on health and satisfaction.

During a Post Occupancy Evaluation (POE) of a new school in Plymouth the results of the Building Use Studies (BUS) satisfaction questionnaire recorded one of the highest ever overall scores. However, the energy analysis indicated that the building was actually using significantly more heat energy than anticipated during the design stage. Investigation uncovered that the occupants liked the simple and easy to use natural ventilation strategy for classrooms which included the use of night vents during warmer months. However, a significant number of night vents were found to be left open overnight in winter causing the BMS optimiser to bring the space heating on earlier than intended leading to wasted energy. The teachers would come into their rooms in the morning to find them both warm *and* fresh leading to high occupant satisfaction.

There may be a connection then between the amount of control provided to the occupants and the uncertainty in actual energy consumption, but also, interestingly, occupant satisfaction. The level of control provided to occupants will depend both on the type of building but also the type of space within a building. During design it is important to consider the level of control occupants will have in different areas and what measures can be taken to ensure "appropriate" use of these.

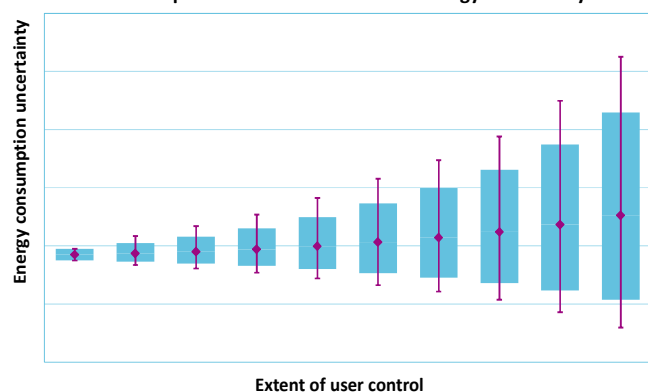
Research has shown that one of the most effective interventions that can be used to influence control use by occupants is prompts. A successful prompt needs three key aspects: timeliness (appears at moment action required), specificity (tells occupant what action to take), and salience (stands out). In the case of the natural ventilation in the case study building, the prompt to indicate appropriate use was a small traffic light LED display. This was considered to be a poor prompt as although timely it was neither specific or salient. Essentially anything can be used as a prompt if it fulfils these three criteria and as designers we should be attempting to incorporate them within our control strategies.

Richard Tetlow, YEPG, April 2016

## Key Lessons Learnt

- The potential impact of occupants' behaviour on energy consumption is related to the amount of control.
- Control use can be influenced through the use of prompts.
- The more control afforded to the occupants the more uncertainty in actual energy consumption.
- Anything can be used as a prompt as long as it satisfies three key criteria: timeliness, specificity, and salience.

Relationship between user control and energy uncertainty



## Further Information

- [Building Use Studies questionnaire](#)
- [Tor Bridge High Community College Building Performance Evaluation](#)
- [Prompts to influence behaviour](#)