

Technologically dependent ventilation in a temperate climate- A UK case study

Gráinne McGill^{1,*}, Tim Sharpe¹

¹ Mackintosh Environmental Architecture Research Unit, Glasgow School of Art, Glasgow, Scotland

* *Corresponding email: G.Mcgill@gsa.ac.uk*

SUMMARY

A fundamental shift in sustainable design thinking and practice has occurred over the last few decades. In particular, the increasing application of heat recovery ventilation (MVHR) is changing the way we envisage the home environment. Instead of passive, adaptive spaces, there is an increasing trend towards the creation of airtight envelopes, where dependence is placed on technological devices to condition the interior environment. This dependence however presents a number of challenges and risks that are of particular concern in a social housing context. This paper discusses the inherent challenges of technologically dependent ventilation in airtight housing in a temperate climate in Scotland. A door-to-door survey was conducted in 36 homes which investigated occupant behaviour and perceptions of ventilation in their home. The study identified issues with occupant use and control of ventilation, with particular concerns relating to the perception of MVHR systems.

PRACTICAL IMPLICATIONS

The findings suggest the need for improvements to the design and delivery of MVHR systems with particular attention to the design of control interfaces and the need for training during handover to ensure effective user engagement. The results also raise questions regarding the applicability of ventilation strategies in airtight dwellings that are dependent on technological devices to operate effectively.

KEYWORDS

Heat recovery ventilation, Household Survey, Social Housing, Occupant Use, Perceptions

1 INTRODUCTION

Concerns regarding climate change and fuel poverty have prompted a significant shift in the way homes are designed and built, with a growing emphasis now on increasingly high levels of airtightness, insulation and the adoption of renewable energy technologies. One particular design strategy is the fabric first approach, which aims to minimise heat loss through the incorporation of an air tight envelope and control of ventilation, predominately through mechanical means. This method has grown in popularity, so much so that Mechanical Ventilation with Heat Recovery (MVHR) systems are now expected to become the most dominate form of ventilation in new build dwellings in the coming years (Sullivan et al. 2012). The impact of this step change in ventilation methods however has yet to be explored in any great detail, particularly regarding occupant behaviour relating to the operation of MVHR systems in practice and the perceptions and attitudes of building occupants towards these new technologies. Social housing presents a unique context to explore this premise, since occupants are rarely involved in the design process and are not likely to have a say in the technologies used. It is on this basis that the study emerged, to explore the perceptions and use of MVHR systems in a new-build social housing project, in a UK context.

2 MATERIALS/METHODS

A door-to-door household survey was undertaken using a standard questionnaire to gain information on occupancy levels, occupant behaviour, perceptions of the interior environment and knowledge and attitudes towards ventilation. The survey was carried out on a new-build social housing development in Glasgow. The development contains a total of 49 social rent flats. Households were first contacted by letter to provide information about the study and invite them to take part in the household survey, which was followed up by door-to-door visits. Responses were received from 36 households in total. Physical measurements were undertaken in 4 case study homes.

3 RESULTS

The survey identified concerns regarding occupant knowledge and use of the MVHR system in practice. For instance, although all households surveyed were aware of the presence of the ventilation system, there appeared to be confusion regarding how the system was controlled and its purpose. In particular, knowledge of the boost switches was considerably lacking, with only 61% of respondents aware of these in their home (see Figure 1). Of those aware of the presence of boost switches, more than half stated that they were never used. Some occupants expressed concerns relating to the build-up of dust around the supply and extract grilles, with one household stating that they had issues with the ventilation system because of *'the amount of dust it creates'*. Issues were also expressed with noise of the ventilation system (14%), cost of running (3%), and temperature of the incoming air (3%).

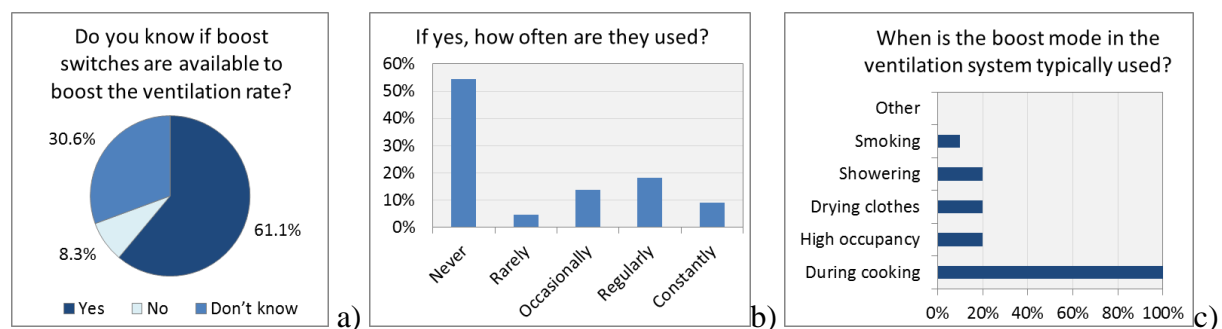


Figure 1. a) Knowledge of boost mode, b) frequency of use, c) type of use

4 DISCUSSION AND CONCLUSIONS

Although based on a limited sample, the results from the survey highlight a potential risk of poor operation and acceptability of MVHR systems in a social housing context. The lack of awareness and use of the boost mode function, combined with low reported frequency of opening windows may have an impact on the quality of indoor air and the potential for moisture build-up indoors. Further monitoring will take place in four dwellings to investigate this in more detail. In dwellings designed to high levels of airtightness, the findings raise questions in respect of the applicability of mechanical ventilation strategies in a social housing context where dependence is placed on adequate user engagement, occupant acceptability of technologies and, fundamentally, the robustness and performance of the systems in practice.

ACKNOWLEDGEMENT

The authors would like to thank the Housing Association for funding the study.

5 REFERENCES

Sullivan et al., 2012, Mechanical ventilation with heat recovery in new homes: Interim report. Milton Keynes: Zero Carbon Hub.