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Reducing carbon from residential heritage buildings while retaining their values

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Reducing carbon from residential heritage buildings while retaining their values

40% of global emissions from buildings and construction

Between 20%-30% of UK homes have heritage value making them harder to retrofit for carbon reduction to meet climate goals. My research is using surveys, case studies and energy modelling to investigate ways to reduce carbon while retaining heritage values, focussing on Cumbria and the Lake District

5.1million pre 1945 homes in the UK

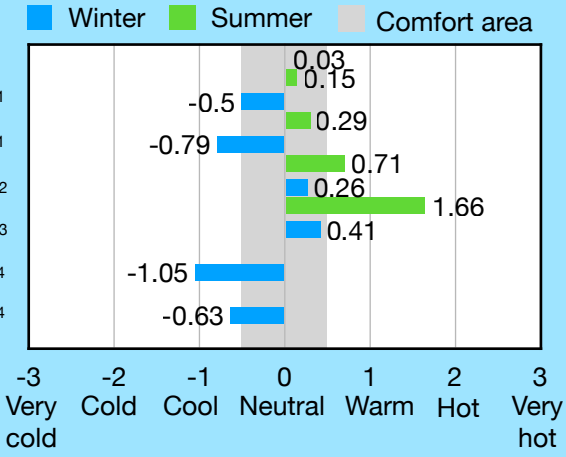
Poster by: Freya Wise

Heritage buildings: old and cold?

Heritage buildings are often considered to be cold and expensive to heat. However my research has found some evidence that they can be just as good as more modern buildings (and sometimes even better!).

My survey of residents' perceptions of comfort in Cumbrian heritage buildings, compared with other research in heritage and modern buildings, suggest that heritage buildings are perceived to perform better than non heritage buildings, especially in summer conditions

Temperature sensation in different buildings



*number of respondents

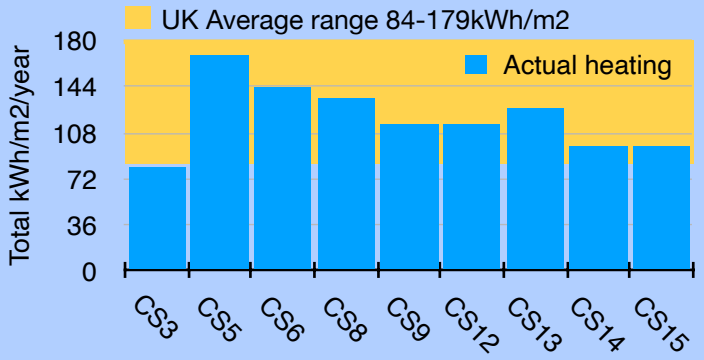
Extremely inefficient to heat?

Heritage buildings are also often thought to be very inefficient to heat.

However, looking at actual, rather than modelled, energy use suggests that it may be the modelling tools that are the problem, because my case study buildings use around average UK energy per square meter for heating.

This is partly because of better building fabric performance than predicted by models and partly because of different user energy behaviours to standard assumptions. Standard models overestimated energy use by an average of 66%

Heating demand vs UK average

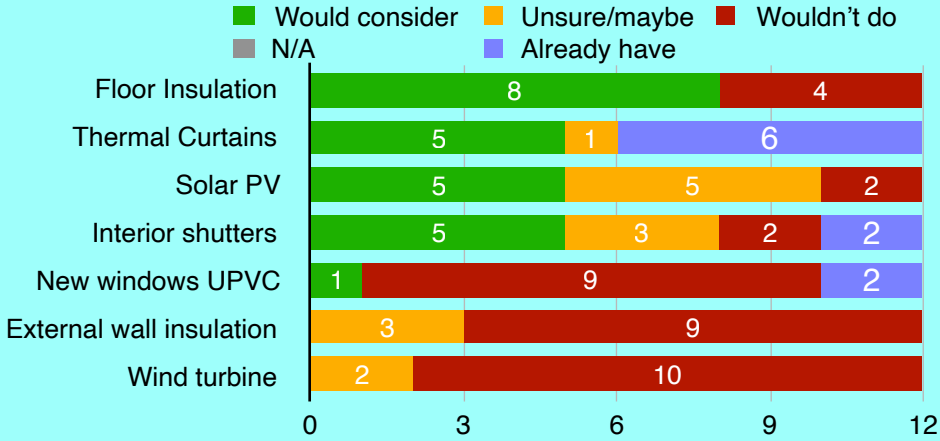


Acceptable alterations?

Through my case study interviews I have discovered that residents have individual and context specific values.

Generally they are not in favour of retrofits that have a visual external impact on their buildings. They also place particular values on their original windows. However there are still changes that they would be willing to make to save carbon.

Acceptability of six key retrofits



References

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(2). Nikolopoulou (2015), https://kar.kent.ac.uk/id/eprint/47653
(3). Teli et al (2016), http://eprints.soton.ac.uk/id/eprint/392663
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Conclusions

My research has shown that heritage buildings can perform better than generally thought in both energy and comfort terms, and that while some retrofits are unacceptable there are changes that residents are prepared to make.

Next steps

The next steps are to model various retrofits to assess their carbon reduction potential. I'll then calculate their carbon footprint to identify their overall impact. The results will be used to inform retrofit policy

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