

Researchers at Oxford Brookes University and University of the West of England have found that passive measures may not be enough to cope with future projected overheating in suburban homes, suggesting that mechanical cooling technology may be required.

so what?

Overheating, already a problem in homes throughout the UK, is projected to increase in frequency and must be considered in all new design and retrofit. The potential need for cooling systems suggests that dwellings designed to meet energy performance targets may not reach the intended goal. This has important implications for policy-making and decarbonisation of the electricity grid, implementation of national retrofit programmes, and upgrading building regulations to future-proof new and existing housing in a warming climate.

Relevance

Reshaping how we use electricity is urgent, making policy decisions on standards for new and retrofit buildings critically important.

From simulations for beyond the 2050s in a number of dwelling types, researchers found that heating demand in retrofit homes is projected to remain significant, whereas in new-build homes post-2016, greater cooling system efficiency will be necessary.

Ultimately, not planning for future overheating and cooling systems could create a new performance gap in design, construction and occupant behaviour.

Findings:

- Thermal mass is shown to reduce the need for future cooling.
- The heat recovery element of Mechanical Ventilation with Heat Recovery (MVHR) may not be necessary in super-efficient homes in winter.
- Ceiling fans combined with natural ventilation may be enough to keep occupants comfortable in the North of England during summer.

Gupta, R., Gregg, M. and Williams, K. (2015). Cooling the UK housing stock post-2050s. *Building Services Engineering Research & Technology*, 36(2): 196–220, DOI: [10.1177/0143624414566242](https://doi.org/10.1177/0143624414566242)

The future climate is projected to change thermal comfort conditions in England. There is potential to adapt to this effectively by prioritising and making use of passive measures first, and then considering use of efficient active systems only when absolutely necessary.

now what?

The need to cool dwellings with active systems in future may require a shift from gas to electricity. However, with a projected increase in and scaling-up of home or community-level electricity generation – solar photovoltaic, solar farms, wind turbines, combined heat and power (CHP) – the UK could be on a path to create a culture and economy of decentralised energy supply and management, whilst gradually shifting the grid from one fuel to the next.

Relevance

When passive measures and opening windows cannot alleviate discomfort in an overheated home, ceiling fans are a useful adaptation as they consume far less energy than a heat pump or air conditioning. They are an affordable and low-energy solution that can effectively increase the adaptive thermal comfort threshold (the threshold at which occupants are no longer able to use adaptive behaviour to cool themselves), especially when coupled with other passive solutions.

However, a fan may not always be enough to cool the occupant as it only provides a cooling sensation rather than actually reducing the air temperature. The ability of fans to meet thermal comfort needs will depend on the intensity of future climate change.



UK homes may need to accommodate unfamiliar technologies to keep cool.

These changes will impact on building and system design, and require commissioning, maintenance and more occupant training and education.

Built environment professionals and policy-makers:

Without adequate planning for these systems, there is a risk that a new performance gap could be created in the design, construction and occupant behaviour, leading to an increase in energy use and associated CO₂ emissions.

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