Researchers at Oxford Brookes University, University of the West of England and Heriot-Watt have found that, in English suburbs, flats and mid-terraced homes are at greater risk of overheating than semi-detached and detached. In particular, the impacts on homes in the South will be greater than on those in the North of England.

so what?

As the effects of climate change become more prominent, comfort in the built environment is projected to change drastically. This is particularly so in the UK's suburbs, where 84% of the population reside. People spend the majority of their time at home, hence their domestic lives will be most affected by changes in the climate.

About 1% of the built environment is modified over the course of a year, so the majority of current suburban buildings will still be here in 50–100 years, with plot structures, road layouts, and major infrastructure lasting even longer. Almost all attitudinal research shows that the majority of people prefer a suburban location for their home.

Relevance

Researchers used the Domestic Energy, Carbon Counting and carbon Reduction Model (DECoRUM®), a GIS-based toolkit for carbon emissions reduction planning. They incorporated climate projection data to estimate the likelihood of future overheating and the effectiveness of adaptation strategies for four suburban house types (detached, semi-detached, mid-terraced and flats). They applied the model to Bristol, Oxford and Stockport. At 2050s, high emissions, 90% probability, models of a dwelling's living room in Bristol and Oxford overheated between 11–18% of occupied hours whereas in Stockport overheating took place between 3–4% of occupied hours.

Digimap (2012). Map©Crown Copyright/database right 2012. An Ordnance Survey/EDINA supplied service.

Dynamic thermal simulations showed which building characteristics indicated a greater risk of overheating:

- **Built form:** Flats
- **Orientation:** West orientation
- **Occupancy pattern:** Those who must remain at home for most of the day are often the most vulnerable
- **Internal gains:** Less efficient hot water systems and lighting, combined with a home's inability to purge these heat gains
- **Albedo (reflective qualities) of external material surfaces:** Darker surfaces
- **Extent of shading:** No shading

Gupta, R. and Gregg, M. (2012) Using UK climate change projections to adapt existing English homes for a warming climate, *Building and Environment*. 55: 20–42 DOI: 10.1016/j.buildenv.2012.01.014

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The most effective non-mechanical (passive) way to tackle overheating combines building fabric improvements and internal heat gain reduction. However, simulations for the South of England suggest it would be difficult to passively adapt homes before the 2050s.

now what?

Suburban areas are often seen as major contributors to climate change, and as places that are currently poorly adapted for future climate impacts. The current UK Building Regulations and retrofitting programmes are primarily concerned with keeping homes warm in winter and CO_2 reduction through energy efficiency measures. It is, therefore, essential that the implementation of national retrofit programmes and future revisions to Building Regulations tackle the risks of, and potential for adapting to, climate change-driven overheating to ensure a comfortable environment for occupants now and in the future.

Relevance

A number of physical changes could be made to suburban homes, gardens and public spaces to limit further climate change, and withstand ongoing changes. These range from small-scale adaptations to homes – such as adding insulation or shutters – and gardens, to large-scale modifications at the neighbourhood level such as greening schemes.

Three principles for keeping homes cool in a heatwave:

1. Reduce the external temperature by managing the microclimate – non-fabric changes e.g. create shade with trees or vertical gardening technique.
2. Exclude or minimise the effect of direct or indirect solar radiation on the building – fabric changes e.g. install external fixed shades or shutters.
3. Limit or control heat within the building e.g. reduce internal gains or manage heat by increasing the building's thermal mass, and improving ventilation measures.

Recommendation:

In the South east of England, implications of increased mechanical cooling on future energy use and grid strain should be investigated further by both the building and the energy sectors.

For further information take a look at the SNACC final research dissemination report.

Local Authorities and social housing providers interested in using DECoRuM®:

OISD provides a professional research and consultancy service to help local authorities, energy advisers and the property industry to apply DECoRuM model® in their cities in order to report, monitor and improve the energy efficiency of both public and private housing.

Gupta, R. and Gregg, M. (2013). Preventing overheating in English suburban homes in a warming climate, *Building Research and Information*. 41:3, 281-300 DOI: 10.1080/09613218.2013.772043

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