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OVERHEATING IN HOMES

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ADVICE & EVIDENCE FROM THE LATEST RESEARCH

This document aims to help identify the properties most at risk of overheating, and to highlight the effective measures which, if implemented at the same time as energy efficiency works, can significantly reduce the risk of overheating.

This briefing highlights the risk that some energy efficiency measures, in certain situations, may cause homes to overheat. Its recommendations are based on findings from recent research into the impacts of climate change in urban and suburban areas.

Homes that are too hot can be uncomfortable, and in the worst cases can lead to illness or even death. Today, cold homes are a much bigger problem that hot ones, but future climate change is expected to increase the overheating risk.

This information is based on findings from the EPSRC funded projects SNACC, CREW and LUCID, and coordinated by the ARCC CN. For more information about these projects and their findings, and to get access to comprehensive reports, go to www.arcc-cn.org.uk/project-summaries/.

Which properties are most at risk of overheating?

- **Location**: Summer temperatures are generally higher in South East England. Built up neighbourhoods will be at higher risk of overheating as a result of the urban heat island effect.
- **Type of properties**: Many factors affect the risk of overheating, including built form and orientation. Flats, especially on the top floor, are identified as being at highest risk.
- **Fabric characteristics**: Internally insulated homes (especially when heavily occupied during daytime), lightweight constructions, homes with darkly coloured facades, homes with roof lights, and homes with large areas of unshaded glazing.

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- **Orientation and exposur**e: Homes with east or west orientation, homes on streets with less tree cover. East facing windows are especially problematic for daytime occupied dwellings. Although south facing rooms can experience overheating, they are easier to shade from the high angle summer sun.
- **Occupancy/behaviour**: An occupant that stays at home all day could experience more overheating than an occupant who is not.
- **Ventilation**: Where noise and security issues discourage the use of window opening for cooling.

Key principles for addressing the overheating risk

- If the property has been identified as being at high risk of overheating then avoid internal wall insulation, unless it is accompanied by mitigating measures.
- Reduce external temperatures by managing the immediately surrounding environments, e.g. by adding green spaces (e.g. planting appropriate trees) and water features (e.g. introduce ponds or fountains).
- Exclude or minimise the effect of solar radiation into the home e.g. by installing shading devices or tinted/heat reflective glazing.
- Limit or control heat within the building by reducing internal gains (switch off appliances and lights when not needed), by ventilation (open windows when outside temperatures are cooler than inside), or by the use of thermal mass (thermal mass can delay heat flow through the building envelope by as much as 10 to 12 hours producing a warmer house at night in winter and a cooler house during the day in summer).

Effective measures

No Cost – behavioural

- Keep windows and curtains or blinds closed during the hottest parts of the day and open windows at other times, particularly to make use of night ventilation to cool the building overnight.
- Increase intake of cold (non-alcoholic) drinks.
- Minimise internal heat gains by switching off lights in unoccupied rooms and appliances not in use.

Low Cost

- Increase air circulation by the use of fans (this advice should be accompanied with a warning of possible dehydration issues)
- Fit internal blinds or curtain linings with a solar reflective coating to reflect the sun.
- Apply solar reflective paint to external walls and roofs to reflect the sun. This is very effective on older properties, with solid brick walls. These coatings could be applied at minimal extra cost as the final coat on external wall insulation render.
- Consider the use of external wall insulation, instead of internal, as it allows the existing thermal mass to remain exposed (so space heat can still be absorbed) and prevents solar gains from reaching the external brickwork.
- Consider reducing internal heat gains (e.g. hot water tank insulation, pipework insulation, temperature controls). Reducing internal gains in older homes is a good way to reduce both overheating and energy use.

Low to Medium cost

- External shading should accompany increased insulation and airtightness measures. Shading should be designed to be seasonally sensitive and/or user controlled (e.g. retractable awnings, shutters). External window shutters are often the most effective single measure for reducing overheating because they block the solar radiation before it enters the building.
- Fixed external shading above windows will block solar gains from the higher altitude summer sun, whilst allowing gains from the lower altitude sun in the other seasons for natural daylight.
- Solar reflective coatings for flat roofs are also effective for top floor flats.

Medium to High cost

- Respect existing thermal mass – where appropriate recommend external insulation as opposed to covering existing thermal mass with internal insulation.

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More information about the projects and their research outputs can be found at www.arcc-cn.org.uk/project-summaries/

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ARCC CN: Adaptation and Resilience in a Changing Climate Coordination Network brings together researchers and stakeholders involved in climate change adaptation in the built environment and infrastructure sectors.

ARCC CN is managed by UKCIP, Environmental Change Institute, University of Oxford.

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