



Department
of Energy &
Climate Change



Guidance on preventing overheating in the home

Identifying and preventing overheating when
improving the energy efficiency of homes.

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Executive summary

This guidance outlines precautions people can take to prevent homes from overheating.

Energy efficiency improvements help make homes warm and cosy in the winter and keep energy bills down. They also help us to reduce our carbon emissions and tackle climate change.

Some energy efficiency improvements can also make homes hotter in the summer months. However, if these improvements are designed and installed correctly, the impact on summertime temperatures within homes can be greatly reduced.

Future climate change is expected to increase outdoor temperatures and we all need to take steps to adapt to a changing climate. Undertaking energy efficiency improvements provides a great opportunity to not only make improvements to the standard of homes, but to also make them more resilient to climate change.

This document can help to identify the homes which may be most at risk of overheating and gives details of measures which, if implemented at the same time as energy efficiency improvements, can significantly reduce the risk of overheating, and the potential use of energy for cooling.

How can I tell if a home is at risk?

Overheating is usually caused by a **combination of factors**, that add up to create a problem. If some of the following factors relate to a home you are retrofitting, read on for guidance on how to reduce the overheating risk.

Before any insulation is installed, a proper assessment must be carried out to investigate whether some of these risk factors apply to the property being inspected, and to discuss the potential impact that any retrofit measures might have on overheating with the householder.

- **Location:** The climate tends to be hottest in south east England. Dense urban neighbourhoods are at a higher risk of overheating as a result of the urban heat island effect, where hard surfaces absorb heat and release it at night.
- **Fabric characteristics:** Highly insulated homes, those with darkly coloured external walls, sky lights or large areas of un-shaded south, east or west facing glazing can be at higher risk.
- **Occupancy/behaviour:** An occupant who is at home all day can be at high risk because temperatures tend to be higher in the early afternoon.
- **Orientation and exposure:** Homes with windows facing east or west and which are exposed to the sun can be at risk. Shading from trees and adjacent buildings can reduce exposure. East facing rooms can be at risk for daytime occupied homes and south facing rooms can overheat too, but are easier to shade from the high angle of the summer sun.
- **Ventilation:** Where noise and security issues discourage the use of window opening for cooling, overheating can occur. Single aspect flats can also be at risk because they are harder to through-ventilate.
- **Type of property:** Top floor flats can absorb a lot of heat through the roof and can be more exposed to direct solar radiation, so can be at risk, especially if the roof is not insulated.

What can be done to help reduce the risk of overheating?

In many properties it is possible to reduce the risk of overheating by selecting appropriate retrofit measures and designing them carefully. The following measures may be appropriate if a property has been identified as being at risk of overheating.

- 1) For homes with unshaded east, west and south facing windows, the amount of solar gain can be reduced by installing external shading devices like shutters.
- 2) For homes where overheating has been identified as an issue, the risk from new or extra internal wall insulation must not be increased. If internal wall insulation is not the most appropriate solution, consider alternative approaches, such as external wall insulation.

More details on tackling overheating

The following solutions may also be appropriate for some properties.

Low cost solutions:

- 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. It is very effective on older properties with solid brick walls. Such coatings could be applied at minimal extra cost as the final coat on external wall insulation render
- Consider reducing internal heat gains (e.g. by adding 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.

Medium cost solutions:

- External shading should ideally 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 and winter heat. They are most suited to south facing windows.
- Solar reflective coatings for flat roofs are also effective for top floor flats.

Higher cost solutions

- Preserve existing exposed thermal mass within the building – where appropriate recommend external insulation as opposed to covering existing thermal mass with internal insulation. External insulation has the added advantage that it shields the thermal mass in the wall from the direct heating from the sun.

Advice to give to customers on how to reduce the risk of overheating:

If a household is experiencing uncomfortably hot conditions, the following actions can help:

- Minimise heat gains by switching off unneeded lights and appliances when not in use.
- Keep windows and curtains closed during the hottest parts of the day, and open (when safe) at other times to cool down the home, especially at night
- Reduce the temperature outside the home, by adding external greenery and/or water features around the building
- Increase the intake of cold (non-alcoholic) drinks during hot weather
- Some vulnerable residents may need additional help. The NHS heatwave plan has useful advice (see Sources of further information and guidance)

What to do if you think that a property might be at risk of overheating

- Seek further information and guidance. Some relevant publications are listed below.
- Consider engaging the services of a building professional who will be able to give further, property-specific advice and analysis. You may consider talking to an Architect, Surveyor or Building Services Engineer. Further information can be obtained from the relevant professional organisations: RIBA, RICS and CIBSE.
- Discuss the issue, and potential mitigation measures, with the customer.

Sources of further information and guidance

Here are some useful sources of information on overheating in buildings. Some of the information included here describes strategies for new-build properties, or measures that relate to the workplace - but many of the principles and actions they suggest may still be relevant to domestic retrofitting projects. There is also information about advising residents on how to reduce their risks by, for example, keeping rooms shaded, and other behaviour changes.

CIBSE

Briefing report 'Thermal comfort in a 21st century climate' – this includes a case study of a new home. Free to download.

<http://www.cibse.org/knowledge/cibse-briefing/briefing-10-thermal-comfort-in-a-21st-century-clim>

Briefing report 'Keeping Cool in a Heatwave 1_ Top Tips for Facilities Managers'. Free to download.

<http://www.cibse.org/knowledge/cibse-other-publications/keeping-cool-in-a-heatwave-1-top-tips-for-faciliti>

Briefing report 'Keeping Cool in a Heatwave 2_ Top Tips for Building Users'. Free to download.

<http://www.cibse.org/knowledge/cibse-other-publications/keeping-cool-in-a-heatwave-2-top-tips-for-building>

Knowledge Series 16, 'How to manage overheating in buildings'. Download free to CIBSE members only.

<http://www.cibse.org/knowledge/cibse-ks/ks16-how-to-manage-overheating-in-buildings>

HSE

Guidance for managers for keeping workplaces comfortable and productive,

www.hse.gov.uk/temperature/index.htm

NHBC

Understanding overheating – where to start

<http://www.nhbcfoundation.org/Publications/Guide/Understanding-overheating-Where-to-start-NF44>

Designing Homes for the 21st Century

<http://www.nhbcfoundation.org/Publications/Guide/Designing-homes-for-the-21st-Century-NF50>

PRP architects

Briefing note on summer overheating in dwellings

<http://www.prparchitects.co.uk/our-work/research/prep/summer-overheating-in-dwellings.html>

London Climate Change Partnership

'Your social housing in a changing climate' reviews adaptation retrofitting work done on two London tower blocks. It includes a well-written section on the measures installed to address overheating concerns. <http://climatelondon.org.uk/wp-content/uploads/2013/02/Your-social-housing-in-a-changing-climate.pdf>

NHS

Advice for citizens during heatwaves

<http://www.nhs.uk/Livewell/Summerhealth/Pages/Heatwave.aspx>

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