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Thermal Comfort All Year Round with Klimatica

Quick guide

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Summary

As the UK adapts to a changing climate, retrofit needs to do more than keep homes warm and reduce winter energy demand. Increasingly frequent and severe periods of hot weather mean that **overheating and summer thermal comfort need to be considered alongside winter performance**.

This guide explores how retrofit can help buildings remain comfortable throughout the year. Drawing on insights from **Dr Victoria Tink, Co-founder of Klimatica**, it considers overheating risk, the buildings and residents most vulnerable to heat, and practical approaches including insulation, shading and ventilative cooling. A central message is that good retrofit requires **holistic design**: measures intended to improve winter performance should be considered alongside how the building will perform during hotter summers.

Introduction

Dr Victoria Tink, Co-founder of Klimatica, is a leading expert in thermal comfort and overheating in buildings. With a background spanning energy efficiency, decarbonisation, thermal comfort and overheating research, she has also contributed to the development of England's Building Regulations, particularly Parts L and O. This guide draws on her insights into the growing challenge of overheating in UK buildings.

Klimatica develops software that integrates with building management systems and dynamically adjusts temperatures according to changing conditions. Its approach draws on **adaptive thermal comfort**, recognising that people's comfort expectations change with the seasons rather than requiring buildings to maintain a fixed temperature throughout the year.

The discussion brings this principle into retrofit: **thermal comfort should be considered as a year-round outcome, rather than retrofit being designed primarily around keeping buildings warm in winter.**

Why overheating matters in retrofit

Overheating is no longer an occasional concern limited to exceptionally hot summers. Victoria highlights increasing temperatures and more frequent heatwave events are evidence that the way UK buildings respond to heat needs greater attention.

The consequences extend beyond discomfort. Excessive indoor temperatures can contribute to heat stress and hospitalisation, while disrupted sleep can affect wellbeing, productivity and safety. Older people and very young children can be particularly vulnerable to high temperatures.

If buildings are not adapted, occupants are also likely to find their own ways of staying cool. Victoria warns that this could lead to greater use of portable air-conditioning, adding electricity demand, carbon emissions and household costs – potentially creating a new challenge of **"summer fuel poverty"** for people who cannot afford to cool their homes.

> ***"We need to be thinking about thermal comfort year round."***
> *Dr Victoria Tink, Co-founder, Klimatica*

The implication for retrofit is important: a home should not be considered successful simply because it performs well during winter. **Summer resilience should form part of retrofit planning from the outset.**

Where overheating risk is greatest

Overheating is highly dependent on the interaction between **location, building form, design and occupants**.

Victoria identifies London and the South East as particularly exposed because of warmer conditions, solar gains and, in London, the urban heat island effect. Some areas of Manchester can experience similar urban heat island effects.

Certain building types also require particular attention during retrofit:

- **Commercial-to-residential conversions** can experience severe overheating where extensive glazing designed for another use is combined with new internal layouts.
- **Highly glazed extensions and conservatories** can introduce substantial solar gains into otherwise comfortable homes.
- **Older loft conversions** with poor roof insulation can experience significant heat gain through the roof.
- **Flats connected to heat networks** can be affected by heat losses from poorly insulated distribution pipework, particularly through enclosed corridors.
- **Single-aspect flats** can be difficult to cool because opportunities for cross-ventilation are limited.

These examples illustrate why overheating cannot be treated as a standardised technical problem. **Retrofit assessments need to understand how each dwelling gains, stores and releases heat, as well as how residents actually use the building.**

Designing retrofit for winter and summer

Victoria argues that many measures used to improve winter energy performance can also support summer comfort when designed appropriately. **Insulation and airtightness**, for example, can help limit unwanted heat entering a building during periods when external temperatures are higher than internal temperatures.

However, summer resilience requires additional consideration of two particularly important strategies: **solar shading and ventilative cooling**.

How to keep heat out in the first place

Solar gains through glazing can be a major source of overheating. Internal curtains and blinds can help, but once solar radiation has passed through the glazing, some heat has already entered the building.

External measures – including **shutters, external blinds and appropriately designed overhangs** – can therefore be more effective because they intercept solar radiation before it enters the home. Where significant retrofit work is already taking place, Victoria suggests that this is an opportunity to incorporate shading rather than treating it as a later addition.

Where the new building design adds glazing, particularly highly glazed extensions, shading must be incorporated into the design in order to prevent very high temperatures.

How to remove excess heat

Buildings also need ways of releasing accumulated heat. Large, usable window openings can enable **ventilative and night-time cooling**, replacing warm indoor air with cooler external air when conditions allow.

This is different from the background ventilation required for indoor air quality. Victoria notes that removing heat requires far greater volumes of air than those provided by trickle vents or normal background ventilation.

The preferred hierarchy is therefore to **reduce heat gains and maximise passive cooling before turning to mechanical cooling**. In some high-risk homes, air-conditioning may ultimately be necessary to protect health, but it should not compensate for avoidable weaknesses in building design. Particularly as this comes at high cost and inconvenience to occupants to cool their overheating home.

Resident's role

Technical measures alone do not guarantee thermal comfort. Many passive cooling strategies depend on residents knowing **when and how to use them**.

For example, occupants may need to close shutters before the strongest solar gains occur, keep windows closed while external temperatures are high, and then open them later when outdoor air becomes cooler. Victoria describes residents, in effect, as becoming their own cooling system.

However, retrofit design must avoid assuming that residents can simply open windows whenever required. Noise, smells, insects, security and proximity to busy roads can all affect whether a ventilative cooling strategy is realistic. Designers therefore need to consider the lived circumstances of occupants and whether the proposed solution can actually be used safely and comfortably.

This makes **resident handover and communication an integral part of overheating resilience**. Residents should understand how the different elements of their home work together and be provided with a simple strategy explaining what actions to take during hot weather.

> ***"We're all our own cooling systems… we have to undertake a number of behaviours every day to keep ourselves cool."***
> *Dr Victoria Tink, Co-founder, Klimatica*

Key considerations

A key lesson from the discussion is the importance of **holistic design**. Victoria explains that homes can be made more resilient to summer heat with relatively small additional changes, particularly when overheating is considered early in the retrofit process.

For project teams, several practical considerations emerge:

- **Consider overheating from the start** rather than after winter measures have already been designed.
- **Review glazing and solar gains**, particularly where extensions, conservatories or large areas of glazing are proposed.
- **Integrate effective shading**, with external solutions considered where appropriate.
- **Maximise safe openable area** to enable night-time and ventilative cooling.
- **Consider the resident's circumstances**, including noise, security, smells and child safety, when designing ventilation strategies.

- **Provide residents with a clear, written summer-use strategy** explaining how and when to use shading, windows and other measures. This should could be digital so it can't be lost.

Ultimately, thermal comfort is not about maintaining **21°C all year round**. Adaptive thermal comfort recognises that people can be comfortable across a range of temperatures and naturally acclimatise to seasonal conditions. The objective should instead be to create buildings that remain **safe, comfortable and resilient as conditions change**.

For retrofit, this means expanding the question from **"How do we keep this home warm?"** to **"How will this home keep its residents comfortable throughout the year?"**

Resources

Referenced resources:

Thermal comfort all year round with Klimatica

Klimatica