Turning up the heat: nine discussion questions on overheating in domestic homes in the UK

By Matthew Scott and Noelene Marisa Yesudas

In collaboration with:

University of Glasgow

UK Collaborative Centre for Housing Evidence (CaCHE)

Chartered Institute of Housing (CIH)

March 2025

UKRI Economic and Social Research Council

UKRI Arts and Humanities Research Council

Chartered Institute of Housing

UK COLLABORATIVE CENTRE FOR HOUSING EVIDENCE

Contents

Summary

This discussion paper is the second of two publications on overheating, released collaboratively by the University of Glasgow, the UK Collaborative Centre for Housing Evidence (CaCHE), and Chartered Institute of Housing (CIH). The first briefing[1] summarised the current evidence on the risks of overheating in homes, provided an overview of who is most at risk of overheating, and examined current government policies to mitigate the risk of overheating.

The paper aims to deepen the discussion by posing nine questions: four for the housing and built environment sectors, and five for government. These are questions that we need to be asking, and beginning to grapple with, with some urgency. The questions are intended to be the starting point for debate and conversation; there are no answers here, only suppositions. But it is our contention that unless we start thinking through these questions now, the impact of overheating in homes could be unnecessarily severe.

- Do we know enough about how our homes will cope with warming scenarios of between 1.5°C and 3°C?
- How are we collecting data to understand overheating in our homes at the moment?
- How are we using PAS2035 to limit the risk of overheating through retrofit?
- Are we doing enough to prioritise green and blue spaces in development and placemaking initiatives, and what are the challenges of doing so?
- How do we get good national data on the prevalence of overheating?
- Is Approved Document O fit for the future?
- Can a home be decent if it is not sufficiently protected from overheating?
- Should our definition of fuel poverty be expanded to include homes that get too hot, as well as too cold?
- Do we need a national overheating strategy?

In the briefing, we do not propose firm answers to these questions. Instead, we discuss why we think they are important questions to pose and summarise some of the evidence that suggests that we need to be thinking about our answers to them now. We hope that in posing these questions, we can both raise awareness of some of the challenges a warming world presents and begin a conversation about how we mitigate some of the risks. We would welcome the opportunity to discuss this further with interested readers, both from government and the housing and built environment sectors, as well as beyond.

1 Yesudas, N.M. (2024) The heat is on: the growing problem of overheating in domestic homes in England and the need for a national strategy.

Introduction: The problem of overheating in homes

> "[2018] was England's hottest summer on record, but typical of those that will be experienced in the 2050's: the results provide a glimpse into the future."[2]

> "In July 2022, London hit 40°C. During that heatwave, the London Fire Brigade received 2,496 calls, including 740 relating to wildfires, and operations were cancelled at Guy's and St Thomas' hospitals as IT servers broke down in record heat. The East Coast mainline was disconnected from King's Cross as trainlines buckled and overhead lines sagged. In 2022, there were 3,271 heat related deaths in England and 387 in London. The 2022 heatwaves would not have happened without climate change, but many of those deaths would have been preventable." [3]

The summer heatwaves of 2018 and 2022 were unprecedented in England.

However, on current pathways, they are typical of the kind of temperatures the country will endure in two decades. Limiting global heating to 1.5°C, which is central to the Paris Agreement, is becoming increasingly unlikely. In fact, projections by the UN Environment Programme state that even in the most optimistic scenarios, the chance of limiting global heating to 1.5°C is only 14 per cent, "and the various scenarios leave open a large possibility that global warming exceeds 2°C or even 3°C." [4]

If these scenarios come to pass, we will see the extraordinary summer temperatures of 2018 and 2022 become the norm. The UKCP18 climate projections published by the Met Office provide a glimpse of how this will occur.[5] At 2°C of global warming, the Met Office states that the South East of England may see summer temperatures between 3°C and 4°C higher than the present day. On average, warming will be at least 1°C to 2°C throughout the year across the whole of the UK. At 4°C of global warming, summer temperatures will rise by between 3°C and 4°C across the country. These rises are also likely to be higher in urban areas, due to the Urban Heat Island (UHI) effect. For instance, the Royal Meteorological society has noted that cities the size of London experience the UHI effect that produce temperatures of up to 10°C higher, and that other UK cities can experience temperatures of up to 8°C higher.[6]

This has an acute relevance for our homes. In our first briefing, published in March 2024, we set out our current understanding of overheating in domestic homes, as well as key challenges and common mitigations.[7] In this follow-on briefing, we propose that there are nine questions that the housing and built environment sectors and national government needs to consider. In the briefing, we do not propose firm answers to these questions. Instead, we discuss why we think they are important questions to pose and summarise some of the evidence that suggests that we need to be thinking about our answers to them now.

We focus first on posing four questions for the housing and built environment sectors, before our five questions for government. We hope that in posing these questions, we can both raise awareness of some of the challenges a warming world presents and begin a conversation about how we mitigate some of these risks.

2 Lomas, K.J. et al. (2021) Dwelling and household characteristics' influence on reported and measured summertime overheating: A glimpse of a mild climate in the 2050's, Building and Environment 201: 107986.
3 Mayor of London (2024) London Climate Resilience Review: final report, p.16.
4 UN Environment Programme (2023) Emissions gap report 2023.
5 Met Office (2019) UKCP18 Factsheet: Derived projections.
6 Royal Meteorological Society (2017) Urban heat islands.
7 Yesudas, N.M. (2024) The heat is on: the growing problem of overheating in domestic homes in England and the need for a national strategy.

Four questions for the housing and built environment sectors

Do we know enough about how our homes will cope with warming scenarios of between 1.5°C and 3°C?

We know from previous research that some kinds of home are potentially more likely to be affected by overheating; flats,[8] bungalows,[9] homes created through material change of use processes,[10] as well as homes with conservatories,[11] are just four examples. We also know from previous research that different groups of people are sometimes more likely to be at risk from overheating. For example, the Resolution Foundation highlights that "those in society who are most disadvantaged, the poor, those living in social housing, the elderly and the unemployed, disproportionately suffer from overheated homes." [12] To take age as a key example, ONS analysis shows that during heat-periods in 2022, there were 5,017 deaths above average in those aged 70 years and over, compared with 1,749 deaths below average in those aged under 70 years. [13]Dementia and Alzheimer's disease was the leading cause of excess deaths in England and Wales during 2022 heat-periods, [14] and analysis by the Resolution Foundation has also found that "young children (particularly babies) can find it hard to keep cool, or risk health difficulties from poor sleep if bedrooms are too warm." [15]

As temperatures climb, we need to ask if we have a sufficient understanding of the vulnerability of our homes, and individual residents who live in those homes, to the risks associated with overheating. There is some indication of how it can do this. For instance, the Welsh Government commissioned a review by academics at Cardiff University to understand the resilience of Welsh homes to climate change. The resulting report undertook climate resilience modelling to identify climate vulnerabilities specific to the Welsh housing stock, finding that increased incidences of summertime overheating, poorer indoor environmental quality through increased relative humidity, and building fabric vulnerabilities (to e.g. wind and rain) were significant future risks.[16] We are also aware that some housing providers are exploring similar exercises for their own homes, and there is at least one housing provider in the early stages of investigating overheating, particularly in Independent Living Schemes where centralised heating systems can cause an increased risk.[17]

But broadly, it is currently unclear whether we have a good enough grasp of how many homes will be at risk of overheating in a world with between 1.5°C and 3°C of warming, and who will be at most risk of experiencing harm as a result. To understand the future risks, a mixture of modelling exercises, qualitative research, and consideration of different warming scenarios is likely needed, and collaboration across the housing and built environment sectors – especially on methodology for doing this – will be important to doing so.

How are we collecting data to understand overheating in our homes at the moment?

Refocusing from the future to the present, there is now a growing use of in-home sensors and other technologies to monitor a wide variety of environmental factors in the home. Given longstanding issues in the sector on tackling fuel poverty and reducing damp and mould, social housing has typically been at the forefront of these initiatives. The use of sensors monitoring temperature, humidity, carbon monoxide, carbon dioxide, air quality, and other environmental qualities have become common in the social housing sector, with a range of service providers now working with the sector to translate data into actionable insights that can reduce the risk of hazards developing (or not being spotted). To provide only one example, social housing providers have used thermal and humidity data loggers to understand the impact of new heating system installations. Loggers tend to be placed in a background position in relevant rooms, and are kept away from direct sunlight, heat, cold, and draughts to collect accurate readings.[18]

Similarly, the social housing sector has an increasingly strong understanding of the individual components (like taps and doors) that are installed in homes. The Regulator of Social Housing's new consumer standards also say that social housing providers "must have an accurate record at an individual property level of the condition of their homes, based on a physical assessment of all homes and keep this up to date", and that they "must use data from across their records on stock condition to inform their provision of good quality, well maintained and safe homes for tenants." [19] Data from stock condition surveys, which in the social housing sector are now complimented by data from more ad-hoc inspections,

8 Marsh, R; Chang, M. and Wood, J. (nd) The relationship between housing created through Permitted Development Rights and health: a systematic review.
9 Wright, D.L; Haines, V.J. and Lomas, K.J. (2018) Overheating in UK homes: Adaptive opportunities, actions and barriers.
10 Marsh, R; Chang, M. and Wood, J. (nd) The relationship between housing created through Permitted Development Rights and health: a systematic review.
11 Lomas, K.J. and Porritt, S.M. (2016) Overheating in buildings: lessons from research. Building Research & Information 45: 1-18.
12 Resolution Foundation (2023) It's getting hot in here.
13 ONS (2022) Excess mortality during heat periods, 1 June to 31 August 2022.
14 ONS (2022) Excess mortality during heat periods, 1 June to 31 August 2022.
15 Resolution Foundation (2023) It's getting hot in here.
16 Welsh Government (2022) How resilient are buildings in the UK and Wales to the challenges associated with a changing climate?
17 Accent Group (nd) ESG Report 2022/23.
18 National Energy Action (2019) Comparison of Two Electric Heating Solutions for a Tower Block.
19 Regulator of Social Housing (2024) Safety and Quality Standard.

is then held in asset management systems of different kinds, allowing the delivery of planned maintenance and cyclical works.

The questions that follow are simple: how might the housing and built environment sectors use data collected by in-home environmental monitoring and stock condition surveys to understand and respond to overheating in our homes? Homes with temperature monitoring sensors can provide insights on how our homes are responding in summer and/or in heatwaves, and it is feasible that data on windows (e.g. glazing and orientation) and insulation can be used to understand how much heat homes will gain in hotter temperatures. If they exist, these kinds of insights are undoubtedly concentrated in the social housing sector, and it is not clear whether data collection of this kind is feasible within the private rented and owner occupied sectors. Despite this, in-home environmental monitoring offers the best pathway to understanding the current prevalence of overheating in homes.

How are we using PAS2035 to limit the risk of overheating through retrofit?

PAS2035 is the official standard for whole-house retrofit. It is a British Standard, developed through the British Standards Institute (BSI). At its simplest, it specifies how retrofit projects should be managed and delivered, and compliance with it is a requirement of all current government funded retrofit schemes. PAS2035 is also aligned to specific roles, each with their own responsibilities, the most important of which is the Retrofit Coordinator, who carries overall responsibility for each stage of a retrofit project.[20]

PAS2035 covers overheating in a range of places. Fundamentally, it covers energy efficiency measures that are intended to minimise the risks associated with overheating. The Retrofit Assessor role is required to consider "additional information that might have an impact on the retrofit project now and in the future", including "climate change-induced environmental risks, such as increased flooding, extreme weather conditions, overheating and increased relative humidity."[21] Retrofit designs are meant to include measures to prevent overheating, in accordance with several allied documents, especially the methodology for the assessment of overheating risk in homes, published by the Chartered Institute of Building Services Engineers (CIBSE).[22] A list of measures, such as means of reducing internal heat loads and limiting solar gain, is also included, as is a stipulation to provide advice to the occupant about potential overheating risk.[23]

In theory, PAS2035 is a comprehensive guide to minimising overheating during retrofit design and delivery. In practice, we do not seem to have any evidence of whether homes retrofitted in compliance with it are sufficiently resilient to heatwaves and the kinds of high temperatures we will increasingly see in the coming decades. Furthermore, as TrustMark have pointed out, "the percentage of work currently undertaken under PAS2035 relates predominately to the funded schemes and is a small percentage of all the work carried out in properties across the UK to improve energy efficiency, reduce carbon emissions and reduce energy bills." [24] Outside of government funded schemes, such as the Social Housing Decarbonisation Fund, there is no requirement to consider overheating to the extent that PAS2035 does (which is not to say, of course, that it is never considered at all). Lastly, some in the housing sector have pointed out that twin priorities of retaining heat in winter and cooling in summer can be hard to balance in retrofit work, and that focusing on heat demand can inadvertently create overheating issues in homes that receive energy efficiency upgrades.[25]

Ultimately, we need to be asking: how effectively is PAS2035 creating homes that can in practice keep their occupants – whoever they may be in the present and future – sufficiently cool when temperatures rise? We also need to be asking about the homes that have been retrofitted to reasonable energy efficiency standards without the use of PAS2035, and their likelihood of overheating in the future. The point is often made that we should not be building new homes that will require retrofitting to be zero-carbon; in a similar vein, we should not be retrofitting homes now that might require additional works in the future to make them resilient to warmer temperatures and heatwaves.

Are we doing enough to prioritise green and blue spaces in development and placemaking initiatives, and what are the challenges of doing so?

The term green and blue spaces functions as a shorthand for a range of measures that can reduce solar gain and overheating in homes. One academic study notes that "at the neighbourhood level, green and blue infrastructure including tree-lined streets, parks, ponds, canals, and water permeable surfaces can reduce ambient temperatures and provide places for respite during warm weather."[26] The UK Green Building Council has emphasised that urban tree cover is especially important for reducing overheating, but is sparse in many urban areas.[27] The Woodland Trust has recommended that

20 Retrofit Academy (2023) Retrofitting dwellings for improved energy efficiency: specification and guidance.
21 Retrofit Academy (2023) Retrofitting dwellings for improved energy efficiency: specification and guidance, p.13.
22 See CIBSE (nd) Overheating position statement.
23 See CIBSE (nd) Overheating position statement.
24 TrustMark (2024) Evidence submitted to the Energy Security and Net Zero Committee.
25 We are grateful to one of our reviewers for highlighting these points.
26 Taylor, J. et al. (2023) Ten questions concerning residential overheating in Central and Northern Europe, Building and Environment 234: 110154.
27 UK Green Building Council (2024) Building Britain's Future: four opportunities for the next government.

new housing developments should have a tree canopy cover of 30%,[28] and others have suggested that new developments could follow the '3-30-300 rule'; whereby "individuals should see three trees from their dwelling, have 30% tree canopy in their neighbourhood, and live within 300m of a high-quality green space."[29]

Integrating green and blue spaces into planning, development, and placemaking is therefore a recognised method of mitigating overheating. Are we doing enough to prioritise this, and what are the challenges of doing so? Inevitably, we know more about some of the challenges than we do where resilience to overheating is being embedded into new developments. One challenge is funding. Currently, the financing and development of new homes is exceptionally challenging, with funding models hanging by a thread.[30] The new Labour government has committed to accelerate the construction of new homes, pledging to build 1.5mn homes between 2024 and 2029.[31] At the time of writing, reform of the planning system is a priority for Labour, but it has been argued before that planning reform has struggled to grapple with issues of climate resilience and vulnerability.[32] CIH has also noted that previous reforms to the National Planning Policy Framework missed opportunities to strengthen policies to tackle the climate issues head-on and in a more holistic way.[33] However, the most significant problem that requires attention is widespread shortfalls in funding. In this context, placing climate resilience at the centre of development is challenging, and there is a case for more funding being made available to make this happen.

On the other hand, there are initiatives that are underway. For example, the Green Spaces Advisory Board (GSAB) has developed a Green Space Model, detailing how housing providers can utilise green assets to help achieve net zero.[34] Researchers at University College London, in partnership with several local authorities in London, have also developed the Healthy Parks Framework, which aims to support the provision of green and blue spaces that perform crucial ecosystem functions in cities to address the impacts of climate change (like extreme heat).[35] Elsewhere, the Royal Town Planning Institute (RTPI) and the Town and Country Planning Association's (TCPA) Climate Crisis Guide for Local Authorities on Planning for Climate Change, urges councillors, planners, and other practitioners to prioritise addressing climate change as a primary objective of planning and placemaking.[36] Others have wondered if the routine alignment of development with government nature-based funding streams is possible – could we, for example, see funds like the Green and Healthy Streets Fund, Urban Tree Challenge Fund and Woodland Trust Community Wood Fund becoming standard parts of applications to mitigate the risk of overheating in new developments? [37]

28 Woodland Trust (2023) Trees and woods at the heart of nature recovery in England.
29 Browning, M.H.E.M. et al (2024) Measuring the 3-30-300 rule to help cities meet nature access thresholds, Science of the Total Environment 907: 167739.
30 See the analysis in CIH's (2023) Homes at the heart: A strategy for housing.
31 Labour Party (2024) Labour Party Manifesto.
32 Town and Country Planning Association (2024) The TCPA's initial responses to the NPPF consultation questions on climate change.
33 CIH (2023) Chartered Institute of Housing submission to the Levelling-up and Regeneration Bill: reforms to national planning policy consultation.
34 Green Spaces Advisory Board (2024) Green Space Stewardship Model.
35 University College London (2022) Healthy Parks Framework.
36 RTPI and TCPA (2023) The Climate Crisis – a guide for local authorities on planning for climate change.
37 See the respective guidance on the Woodland Trust Community Wood Fund, Urban Tree Challenge Fund, and Green and Healthy Streets Fund.

Five questions for government

How do we get good national data on the prevalence of overheating?

One of the biggest challenges with understanding the extent of overheating in England is data surety. As our first briefing on overheating demonstrated,[38] attempts to quantify the extent of overheating in English homes have been undertaken through different methodologies with different sample sizes. They have also thrown up different results, although with many commonalities, such as the increased prevalence of overheating in London.

Without good data, grasping the scale of the problem across different communities is challenging. The obvious pathway towards building a consistent, year-on-year picture of overheating is through the English Housing Survey, which has included subjective questions on overheating before.[39] This would also enable a disaggregation of the prevalence of overheating by the usual geographical hierarchies (region, local authority, parliamentary constituency, Middle Layer Super Output Area (MSOA) and Lower Layer Super Output Area (LSOA)) and by vulnerability and protected characteristics of the household reference person. However, as with any subjective survey question, questions could be raised about how accurately this would capture the nub of the problem. Another possibility is the use of Energy Performance Certificates (EPCs), which are currently in the process of being reformed across the UK. EPCs are based on an assessment, which could feasibly be a pathway to obtaining data on overheating risk.

Regardless, our current approach to understanding the prevalence of overheating is more of a patchwork than a clear picture, and initiating a national dataset to compliment statistics on excess summer deaths would be a valuable first step towards mitigation and adaptation.

Is Approved Document O fit for the future?

Approved Document O (Part O) is the only government policy that aims to address overheating in new homes.[40] It sets out the overheating mitigation requirements of the building regulations, and contains advice on how these regulations should be complied with. It is also relatively young, first published in 2021. In its technical consultation on the Future Homes Standard, published in December 2023, the government included a call for evidence on how it was working in practice, and whether any changes needed to be made.[41] At the time, some across the housing sector observed that this call for evidence was premature, given that many homes designed to Part O were not yet occupied, and that there was therefore currently insufficient evidence on how it was working practice. The consultation also included proposals to extend Part O to homes created through material changes of use (e.g. office-to-flat conversions), which can often be at more risk of overheating.

Beyond this, however, there are more fundamental questions we might ask of Part O. Although estimates differ, homes built in 2024 are likely to still be standing in around 2080. Under global heating scenarios, especially those at the less optimistic end of the spectrum (e.g. warming of between 2.5°C and 4°C, or even higher), we have to ask the question of whether homes being built now to the standards set out in Part O will be able to cope with higher temperatures in the future.

To think through this question, we could start by comparing Part O to common housebuilding codes in warm and dry climates.[42] One academic study notes that the use of intermediary shaded spaces at the indoor/outdoor interface (e.g. balconies), courtyards, shaded walkways, light coloured and high albedo surfaces, and reduced glazing apertures can all make a difference in reducing overheating. It also notes that exposed thermal mass, to absorb heat during the daytime and reduce it during the night, is widely used as a passive cooling strategy in warm and dry climates. While many of these strategies are addressed in Part O, especially in sections on limiting solar gains and removing excess heat, many are not, with no consideration of, for example, high albedo surfaces. Alternatively, if we look at documents such as London's Energy Assessment Guidance, we do find more of these measures included.[43] Furthermore, it is vital that cooling hierarchies are adhered to in the design of new homes, prioritising the minimisation of internal heat generation and reducing the amount of heat that enters the home in the summer.[44] If we jump straight to mechanical ventilation and active cooling systems, we risk exacerbating (or creating) fuel poverty issues in new homes, because of the amount they cost to run.

One way of answering this question might therefore be to thoroughly stress-test Part O against different warming scenarios, and examine whether housebuilding codes and practices elsewhere in the world can inform future improvements to Part O. It could include a real-world study of how homes built after the introduction of Part O fare in heatwaves. Can people keep comfortably cool in these homes in temperatures of 40°C? Until then, it is difficult to know whether the homes we are building now will be sufficiently protected from overheating in 2080.

38 Yesudas, N.M. (2024) The heat is on: the growing problem of overheating in domestic homes in England and the need for a national strategy.
39 UK Government (2022) English Housing Survey, 2020 to 2021: subjective overheating and construction type - fact sheet.
40 UK Government (2021) Overheating: Approved Document O.
41 UK Government (2023) The Future Homes and Buildings Standards: 2023 consultation.
42 Taylor, J. et al. (2023) Ten questions concerning residential overheating in Central and Northern Europe, Building and Environment 234: 110154.
43 Mayor of London (2022) Energy Assessment Guidance.
44 Environmental Audit Committee (2024) Heat resilience and sustainable cooling.

Can a home be decent if it is not sufficiently protected from overheating?

The Decent Homes Standard currently applies only in the social rented sector, and aims to set the minimum acceptable standard for a modern home. It is based around four criteria:

- It meets the current statutory minimum standard for housing; homes fail to meet this standard if they contain at least one HHSRS Category 1 hazard.
- It is in a reasonable state of repair.
- It has reasonably modern facilities and services, especially in relation to kitchens, bathrooms, common areas, and protection against external noise.
- It provides a reasonable degree of thermal comfort, with adequate insulation and heating.[45]

Considerations of overheating are looped into these criteria in different ways. According to the first criteria, a home cannot be considered decent if it contains an excess heat hazard. It can also reasonably be stated that a home that overheats does not provide a reasonable degree of thermal comfort, although this is ultimately a matter of interpretation.

Government has been reviewing the Decent Homes Standard for several years. According to the National Housing Federation, the review has considered a range of changes, including the introduction of a Minimum Energy Efficiency Standard for the social rented sector.[46] Simultaneously, the government has stated that it will apply the Decent Homes Standard to the private rented sector, which has a higher incidence of non-decency compared to other tenures.[47]

In theory, at least, it would appear that a home that overheats cannot be considered decent. But there are still questions to consider here. The final report of the London Climate Resilience Review concluded that the Decent Homes Standard should set out specific measures for climate resilience, including managing excess heat.[48] Their report states that government "should consider up to date climate projections and require that housing can maintain safe and healthy temperatures in extreme heat."

What might a 'climate resilient standard' look like as part of the Decent Homes Standard? There are at least two options:

- Including non-statutory guidance as part of any new Decent Homes Standard, setting out how to make homes climate resilient, and protect them from overheating risks.
- Amending the Decent Homes Standard entirely to include climate resilience, perhaps through the addition of a new criteria (e.g. Criterion E – 'It is sufficiently resilient to risks associated with a hotter climate').

Either way, considering that four fifths of our existing homes will still be with us in 2050,[49] it is worth us thinking now about how we can better protect those homes from overheating through a new national standard.

Should our definition of fuel poverty be expanded to include homes that get too hot, as well as too cold?

According to the Warm Homes and Energy Conservation Act (2000), "a person is to be regarded as living 'in fuel poverty' if he is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost."[50] Since 2000, there have been three iterations of a formal fuel poverty definition in England, and fuel poverty strategies have been developed in the devolved nations. These strategies have been accompanied by parallel definitions of what it means to have a 'satisfactory heating regime', which for example is defined in the fuel poverty strategy for Wales as:

> "a temperature of 21°c in the living room and 18°c in other rooms for nine hours in every 24 hour period on weekdays, and 16 hours in a 24 hour period on weekends." [51]

Across most definitions, keeping warm at an affordable cost is in essence the threshold for fuel poverty. However, as temperatures rise, we may need to give more serious consideration to the challenges associated with keeping cool at a reasonable cost, especially for households on lower incomes and with heat-related vulnerabilities. This is because some of the factors that make people more at risk of overheating can also make them more at risk of fuel poverty. Fuel prices and household incomes both shape the affordability of running air conditioning and mechanical ventilation, and the fabric (in)efficiency of a home shapes its ability to stay cool as much as it does to stay warm. Moreover, as noted previously, the characteristics, or 'vulnerabilities', of occupants also overlap – people who have a greater need to stay warm for longer generally need to avoid getting too hot as well. This includes young children, older people, and people with pre-existing respiratory and cardiovascular illnesses, as well as expectant parents.[52]

In academic circles, as well as in parts of Europe, there has been a growing turn away from 'fuel poverty' towards broader conceptualisations of 'energy poverty', which broadly refer

45 UK Government (2006) A decent home: definition and guidance.
46 National Housing Federation (nd) Decent Homes Standard.
47 This was promised in the Labour manifesto for the July 2024 General Election, and confirmed as intended to be part of a new Renter's Reform Act in the King's Speech that month. See UK Government (2024) King's Speech 2024: background briefing notes, p.69.
48 Mayor of London (2024) London Climate Resilience Review: final report.
49 Connected Places Catapult (2023) Retrofit 2050: Accelerating homes of the future for health and resilience.
50 Warm Homes and Energy Conservation Act (2000)
51 Welsh Government (2021) Tackling Fuel Poverty: 2021-2035.
52 National Energy Action (2017) Connecting Homes for Health: Phase 1 evidence review. The overheating standards developed by CIBSE also included reference to occupant vulnerability: see CIBSE (nd) Overheating Position Statement.

to the inability to access adequate energy services (e.g. heat, light) to maintain good health and wellbeing.[53] It is very possible that we may need a similar definition in England. This would broaden our understanding of fuel poverty away from the cold towards a kind of 'habitable zone', where someone is defined as living in energy poverty if they cannot keep warm or cool at a reasonable cost.

The knock-on impacts for policy could be considerable but messy: would we, for example, need to accompany the Cold Weather Payment with a Warm Weather Payment, paid during the summer to help poorer households with air conditioning costs? Would we need to fold retrofitting mechanical ventilation, shutters, or blinds into fuel poor retrofit schemes, as recommended by the Environmental Audit Committee, and move towards schemes that focus on futureproofing as much as energy efficiency?[54] Does this add extra credence to the development of an energy social tariff, to ensure that lower-income households can afford to pay for the electricity they need to stay warm and cool?[55] Given that fuel poverty is a devolved policy area, these would be questions for devolved governments as well as the UK government. None of this would be straightforward or easy, but it is high time that fuel poverty policy reckoned with extreme heat, as well as extreme cold.

Do we need a national overheating strategy?

The final question we pose for discussion is whether we need to bring all of the issues discussed in this briefing – as well as others that we have not discussed – together into a coherent national overheating strategy. As noted above, Part O is the only substantive government regulation that deals with overheating, and it applies only to new homes. As a result, several organisations have pointed out that at a more strategic level, we are ill-equipped for tackling the issues that a hotter world will pose to our homes.

For example, in its report on extreme weather and climate resilience, the National Audit Office commented that:

> "There is no policy to address overheating in existing homes and buildings. In addition, plans for new developments do not thoroughly regulate or track adaptation for future climate resilience and there are no clear mechanisms to monitor and mitigate the effects of urban heat islands." [56]

Broader climate adaptation plans, specifically the Third National Adaptation Programme (NAP3), published by the Department for Environment, Food, and Rural Affairs (DEFRA), also have very little to say about overheating.[57] NAP3 can only note Part O as a pre-existing mitigation policy, and lists a swathe of research that government will carry out to deepen its understanding of overheating. In response to the publication of NAP3, the UK Green Building Council observed that it was missing "an urgent and [ambitious] plan to adapt to increasingly severe, frequent and extreme weather like last year's heatwaves which took nearly 3,000 lives in the UK", and that "a national effort to install measures like shutters, insultation, reflective paint, and water-efficient fixtures and fittings in our homes and buildings" was required as part of this plan.[58]

Similarly, the Environmental Audit Committee's report on heat resilience and sustainable cooling noted that a vast majority of its respondents favoured the establishment of a dedicated national heat resilience strategy.[59] This would bring together the various aspects of heat planning and resilience that sit under different government departments and enable a more strategic, long-term approach. The report subsequently recommended the introduction of a strategy of this kind, which it termed a UK national cooling action plan.

The Environmental Audit Committee noted that the Department for Energy Security and Net Zero (DESNZ) said it would lead the development of a UK cooling outlook document with input from all the relevant departments.[60] The final question, therefore, is how to bring together all of the evidence, questions, and considerations discussed throughout this paper into a coherent overheating strategy, which would also necessitate mapping its links to other government strategies (such as the fuel poverty strategy), and to devolution policy.[61] It would lastly need to answer the inevitable follow-on question that follows any strategic plan: how do we pay for it all?

53 See for example EPRS (2023) Energy Poverty in the EU.
54 Environmental Audit Committee (2024) Heat resilience and sustainable cooling.
55 See CIH (2023) A social energy tariff: the benefits of energy market reform for the social housing sector.
56 National Audit Office (2023) Government resilience: extreme weather, p.51.
57 National Audit Office (2023) Government resilience: extreme weather, p.51.
58 UK Green Building Council (2023) Action to tackle overheating in our homes is largely missing from the National Adaptation Programme.
59 Environmental Audit Committee (2024) Heat resilience and sustainable cooling.
60 Environmental Audit Committee (2024) Heat resilience and sustainable cooling.
61 The new Labour government has pledged to introduce significant new devolution legislation and policy. For an overview see Tudor, S. (2024) King's Speech 2024: Devolved affairs.

Conclusion

To reiterate the statement at the beginning of this paper, the questions we have posed in this paper are intended to be the starting point for debate and conversation. We hope that in posing these questions, we can both raise awareness of some of the challenges a warming world presents and begin a conversation about how we mitigate some of these risks. We would welcome the opportunity to discuss this further with interested readers, both from government and the housing and built environment sectors, as well as beyond.

It appears likely that the answers to many of these questions we have posed will be different depending on how much warming we see. The IPCC's AR6 report concluded, with high confidence, that "in Europe the number of people at high risk of mortality will triple at 3°C compared to 1.5°C warming".[62] There is therefore still a broader imperative to limit warming as much as possible. With residential buildings producing 17% of all greenhouse gas emissions in the UK in 2022,[63] the housing and built environment sectors are a significant part of both the challenge and the solution.

However, as we work to reduce emissions from our existing homes, we cannot rely on this to extinguish the problem. To reiterate an earlier point, four fifths of the homes we will inhabit in 2050 have already been built. We cannot afford to wait and see just how bad or hot things get; instead we need to begin taking steps now to mitigate the possible impact of overheating, for both current and future generations.

Acknowledgements

We would like to thank Gemma Brookes, Tom Kennedy, Mehri Khosravi, and Caitlin Robinson for their comments on earlier versions of this paper. We would also like to thank colleagues at CaCHE, especially Gareth James and Glenn Corrigan, for their feedback and support. Any errors are our own.

CRediT author statement

Matthew Scott, Methodology, Investigation, Writing – Original Draft, Writing – Review and Editing, Supervision.

Noelene Marisa Yesudas, Conceptualisation, Methodology, Writing – Review and Editing.

Contact

Matthew Scott, matthew.scott@cih.org

62 The new Labour government has pledged to introduce significant new devolution legislation and policy. For an overview see Tudor, S. (2024) King's Speech 2024: Devolved affairs.
63 DESNZ (2023) 2022 UK greenhouse gas emissions, provisional figures.