Written evidence submitted by the Royal Institute of British Architects

House of Commons Environmental Audit Committee: Heat resilience and sustainable cooling

The Royal Institute of British Architects is a global professional membership body driving excellence in architecture. We serve our members and society in order to deliver better buildings and places, stronger communities and a sustainable environment. Being inclusive, ethical, environmentally aware and collaborative underpins all that we do.

The Royal Institute of British Architects (RIBA) welcomes the opportunity to respond to this inquiry. Around 40% of global carbon emissions stem from buildings and architects have a significant role to play in reducing UK greenhouse gas emissions.

RIBA joined the global declaration calling an environment and climate emergency on 29 June 2019; just two days after the UK Government passed a law stipulating the UK end its contribution to global warming by 2050, by bringing all greenhouse gas emissions to net zero.

We spend on average, about 90 per cent of our time indoors. Architects therefore have a significant role to play in building in resilience to ensure homes can withstand climate-related hazards. Embedding resilient design from the outset can also help to avoid costly retrofits in the future.

The Government must support the built environment to embed effective heat resilience and sustainable cooling strategies in our buildings.

The RIBA recommends that the Government:

- Introduces a National Retrofit Strategy – a long-term plan and investment programme for upgrading the energy efficiency and resilience of our housing stock.
- Ensures form and fabric efficiency is the primary consideration when designing a new home.
- Promotes the uptake of, and require, POE as a condition of procurement for building projects using public funding.
- Consults relevant stakeholders on setting a national target for increasing the area of urban green space.

How can sustainable cooling solutions and adaptation strategies be implemented in such a way as to minimise overheating, reduce energy consumption and prevent overloading of the electricity grid during peak demand?

Minimising heating and reducing energy demand in our existing housing stock

Around 80% of our current building stock will still be in use in 2050, and millions of these homes will need upgrading to reduce overheating risks. Yet, government action to minimise overheating and reduce energy consumption has not yet gone far enough.

To address this issue, the Government must bring forward a long-term, well-funded National Retrofit Strategy. Such a strategy must consider how to improve the energy efficiency of our homes, but also address how our buildings must adapt to a changing climate, including overheating.

A whole house retrofit approach can help to avoid adverse effects, including moisture building or unexpected overheating.

There are around 19 million homes that need to be retrofitted, but to tackle this challenge, a National Retrofit Strategy should include long-term plans for recruiting and upskilling the retrofit workforce. Recent research suggests that retrofit recruitment must triple to meet net zero targets by 2050. There is also an opportunity to create more jobs to meet the huge green skills gap.

Preventing overheating in new homes

Part O is a welcome step forwards to mitigating overheating risk. However, to achieve compliance with the Government has permitted a simplified method be used. We believe this approach is too simple, as it lacks the holistic approach and flexibility offered to architects by a performance-based overheating standard.

Part O, however, does include the option of dynamic thermal modelling, which is a performance-based approach. Dynamic thermal modelling predicts the internal conditions and energy demands of a building at short time intervals using weather data and building characteristics, as an alternative method which also can demonstrate compliance. However, given the methodology is suitable for all new residential buildings and preferable as it considers a wider range of information, a performance-based approach should have been prioritised.

In addition to compliance with a performance-based overheating standard, projects should prioritise form first, fabric secondly, and then technology. This considers site planning and orientation, then detailed design of the fabric, before exploring technological solutions that could enhance the resilience of the home.

It is important that exemplary design, which should prioritise energy usage reduction, considers the site layout to minimise overheating, reduce overshadowing, offer sheltered safe play spaces and allow windows towards the south to utilise winter solar gain. Careful design of the window openings and surrounds is also important to ensure shade is provided during the summer months. This was the approach used for the 2019 RIBA Stirling Prize winner, Goldsmith Street.

Post Occupancy Evaluation

Post Occupancy Evaluation (POE) is the assessment of how building performance measures compare to the design intention. Even if a building has been designed with energy efficiency and user satisfaction at its heart, the promised standards will not always be met. POE helps to ascertain whether a building's performance expectation and delivery match.

POE is vital to continuously improve our built environment – we must take learnings from POE into new projects. For example, POE was undertaken on the New Art Exchange, a cultural centre in Nottingham, with a focus on building performance from the user perspective. The POE revealed issues including overheating in the summer – which were then resolved by educating staff about how to best use the windows to improve ventilation for night-time cooling.

To improve our buildings the Government should promote the uptake of and require POE as a condition of procurement for building projects using public funding.

What actions can be taken to protect those most vulnerable to the impacts of extreme heat?

It is important that we find approaches to avoid and prevent overheating in the first place, as far as possible. This is far better than finding strategies to help mitigate the worst impacts on vulnerable groups.

With rising temperatures, the role of green space, such as green roofs, pocket parks, vertical greening and green corridors are useful to reduce overheating. However, urban green space is declining, and decision makers need to reverse this trend.

Architects and designers can play an important role in supporting green spaces through creative and sustainable design. When designed well, green space can improve the image of open public spaces and promote community cohesion. Local residents can benefit from improved physical and mental wellbeing, as people living in areas with more green infrastructure are statistically more likely to live happier, longer lives.

Does the current planning framework do enough to encourage heat resilience measures such as cooling shelters, water bodies, green infrastructure and shading to be integrated into urban planning? Where such measures are incorporated, how accessible and successful are they?

The existing National Planning Policy Framework (NPPF) states that plans should take a "proactive approach" to climate mitigation and adaptation and references the risk of overheating. It also highlights the importance of new developments in areas of vulnerability being planned to account for resilience and appropriate adaptation measures. However, beyond these brief mentions, there is very little to encourage heat resilience measures.

The Government should ensure that the revised NPPF incorporates adaptation measures and encourages the use of a range of heat resilience measures, which will be essential to protecting people from increasingly frequent and intense periods of hot weather in the years and decades to come. These approaches should include, for example, increasing access to green space such as parks and green corridors, and increasing vegetation across urban areas.

What can be done to protect the UK's existing public and private sector housing stock from the impacts of extreme heat while ensuring that homes are sufficiently warm in the winter months?

Design approaches, such as external insulation over thermal mass in buildings, can help to reduce the energy required to heat buildings – this must be in accordance with the highest safety standards. This also has benefits for preventing cold bridging and therefore the risk of condensation, damp and mould. Adequate ventilation is critical too, to aid night-time cooling and control moisture. A holistic rather than a piecemeal approach should be taken, through a whole house retrofit approach, so it is important that professionals with expertise in this area are consulted.

Achieving good ventilation can be inhibited in densely populated or built-up areas, including security concerns, and air and noise pollution. Design and technology solutions can be harnessed to manage some of these issues, for example, the wider adoption of electric cars could diminish noise pollution further in these areas most affected.

What role might reversible heat pumps (which can act as both heating and cooling systems) and other emerging technological solutions, such as the development of smart materials, play in meeting future cooling demands?

We recommend form and fabric efficiency should be the primary considerations when designing a new home. Any method of delivering heating or cooling should be secondary. New low carbon technologies and products will likely be developed that can offer similar results to heat pumps. These should not be discounted, as we must harness all available solutions to meet future cooling demands and respond to the challenges resulting from the climate crisis and rising temperatures.

However, there is a risk that the drive for technological solutions to meet the climate challenge and stepped targets will undermine the current 'fabric first' approach to building design. Standard (non-reversible) heat pumps will undoubtedly be a help towards the goal of new build becoming carbon neutral. However, we need a high standard of fabric performance all year round, in both winter and summer.

Reversible heat pumps, which can heat or cool in internal spaces, could disincentivise a more energy-efficient passive approach and therefore inadvertently increase energy demand in the domestic sector. We should be promoting approaches which reduce energy demand, not the alternative. It should be noted that conventional (mechanical) cooling is responsible for over seven per cent of global greenhouse gas emissions. Alongside the additional energy cost, further costs include plant maintenance and periodic replacement, which benefits neither occupants nor the economy.

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