

London Climate Week: 30 June 2021



Summertime Overheating in dwellings



Effects of overheating

- Increase in morbidity and mortality.
- Sleep disruption - affecting health, well-being and productivity.
- The old and the very young are especially affected.

What the Climate Change Committee says

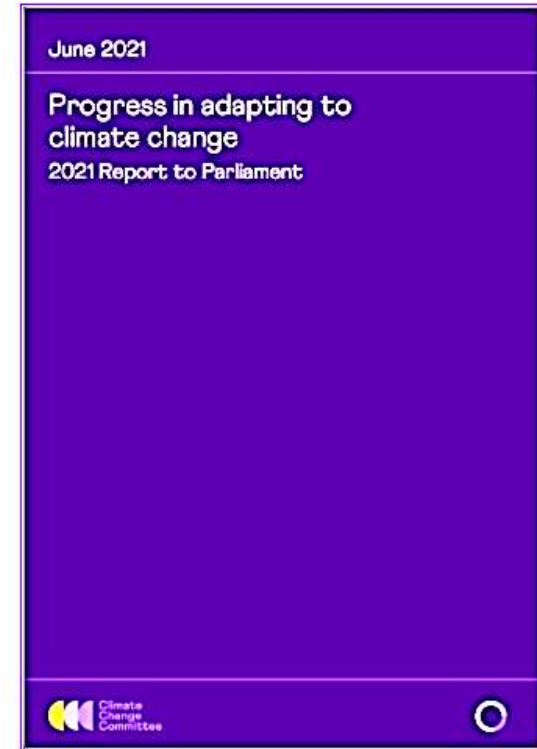
Achieving Net Zero will require effective adaptation.

New Homes

- Regulate overheating as set out in the Future Buildings Standard consultation.

Existing homes

- Buildings must also be protected from overheating as energy efficiency improves.
- Encourage retrofit of passive cooling measures.
- Improve understanding and support actions.



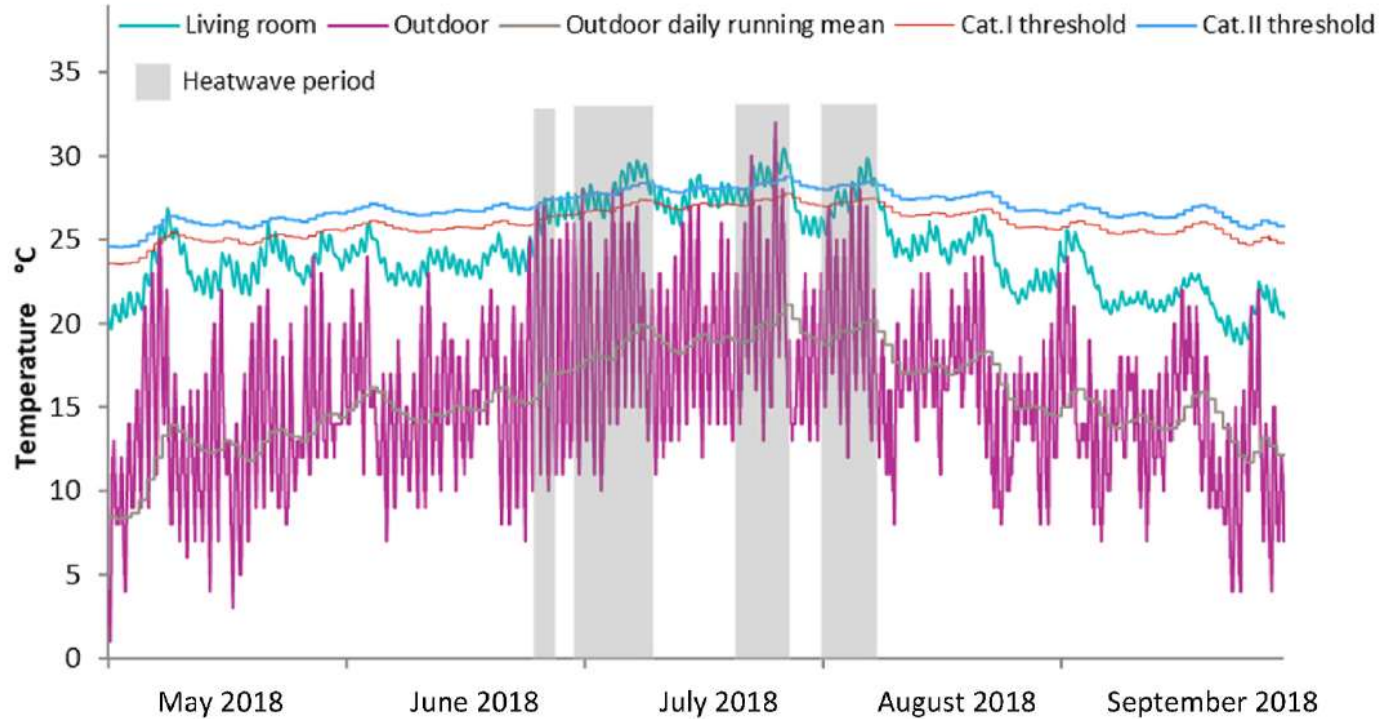
Existing Homes

Lomas, K. J., Watson, S., Allinson, D., Fateh, A., Beaumont, A., Allen, J., Foster, H., & Garrett, H. ***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, 17pp, 24 May, (2021) Doi: <https://doi.org/10.1016/j.buildenv.2021.107986>

A national survey of overheating: the 2017 EFUS

- Total of 750 homes across England.
- Overheating assessed through both temperature measuring and questionnaires.
- Monitored through England's hottest ever summer, 2018 – a typical summer of the 2050's.

How do we measure overheating?



Headline results

- 4.6million bedrooms (19% of the stock) overheated
- 3.6million living rooms (15% of the stock) overheated
- Overheating was more prevalent in bedrooms at night than in living rooms during the day.
- Older people under-reported the incidence of overheating.

Results: the dwellings

- Overheating in the living rooms of London dwellings (28%) was greater than in the other English regions.
- Living room overheating was significantly greater in flats (30%) than other dwelling types.
- Improved fabric energy efficiency did not significantly increase the risk of overheating.

Others have noted:

- Loft and external wall insulation can reduce overheating risk.
- Internal insulation may increase internal temperatures but is easily mitigated.

Headline results: the people

- Overheating was greater in households living in social housing, with low incomes or with members over state pension age.

Also

- Older people are at home longer and so exposed to daytime heat.
- They may struggle to operate ventilation and shading devices.
- They may not perceive the heat.

Thus

- The needs of the elderly should shape mitigation design.

New Homes

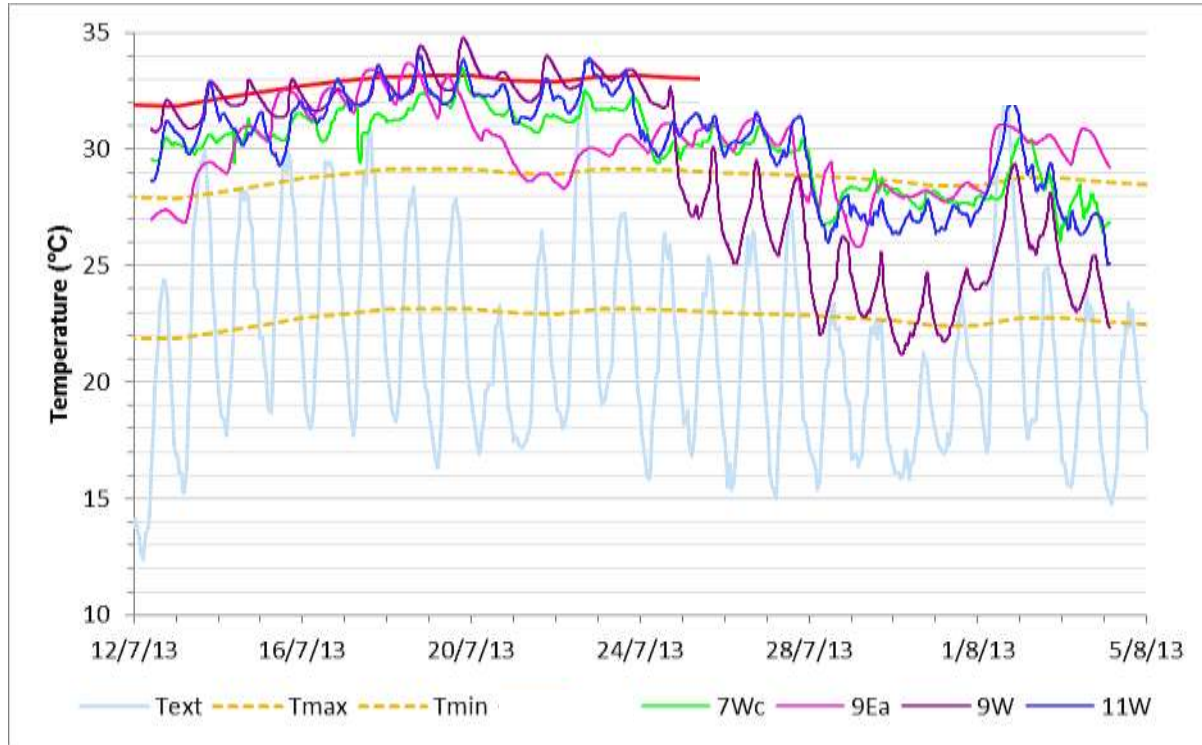
Quigley ES and Lomas KJ, ***Performance of medium-rise, thermally lightweight apartment buildings during a heat wave.*** Proc. 10th Windsor Conf.: Rethinking Comfort, Windsor, UK, 16pp, 12-15 April (2018).

Multi-bedroom flats, Greater London

- Monitoring in 15 bedrooms on floors 1 to 11.
- For 22 days in the summer of 2013



Measured temperature: floors 7, 9 and 11



Why might flats overheat?

The monitored flats

- Single aspect geometry - no cross-ventilation
- Restricted window opening, <100mm.
- No external shading.
- Heat accumulation in 'blind' corridors.
- Hot air rising to upper floors.
- Urban heat island.

Other factors

- Excessive glazing.
- Ineffective blinds and shutters.
- Permanent uncontrolled internal heat gains.
- 'Difficult to operate' windows and doors.
- Urban noise, pollution and security concerns.

Solutions to overheating in flats

Lomas, KJ. ***Summertime overheating in dwellings in temperate climates***. Buildings and Cities, 2(1), pp. 487–494 (2021). Doi: <https://doi.org/10.5334/bc.128>

Reducing overheating

New dwellings

1. Limit the problem;
2. Providing passive cooling measures;
3. Empowering occupants.

Retrofit of dwellings

1. Don't create a problem;
2. Improve passive cooling measures;
3. Empower occupants.

Some interesting examples



External shading

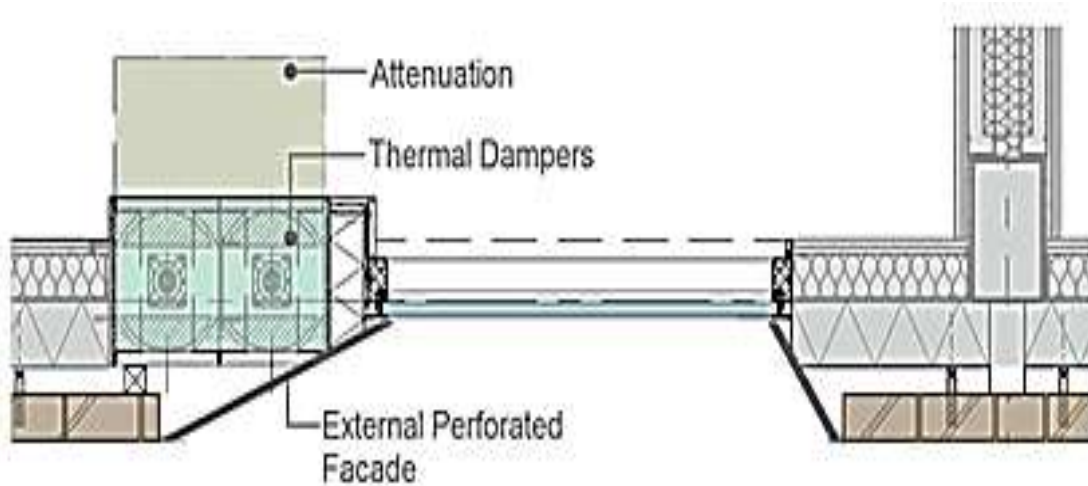


Source: *Lomas*
School of Architecture Building and Civil Engineering



Source: **Mayor of London.** (2018). *Energy, overheating and daylight in tall buildings study* Old Oak and Park Royal Development Corporation, Buro Happold, for the Mayor of London.

Noise control and ventilation



Source: Challenges of using passive ventilation to control the overheating of dwellings in noisy environments

Nick Conlan and Jack Harvie-Clark, Apex Acoustics

Noise control and ventilation



Source: *Challenges of using passive ventilation to control the overheating of dwellings in noisy environments*
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Noise control and shading



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Avoiding overheating: multifaceted, integrated, solutions

- **Building and setting – Planners**

Shading, greening, noise reduction, surface colours, outdoor spaces.

- **Plan form – Architects**

Cross-ventilation, glazing areas and articulation, balconies and roof gardens, overhangs and side-fins, shutters and blinds.

- **Heating ventilation and lighting – Engineers**

Hot water circulation, mechanical ventilation, Window g-values, security of night ventilation, window operability.

- **Occupant guidance – Building owners**

‘Homeowners manual’ –what to do and when.

Sources of guidance

Lomas, KJ. ***Summertime overheating in dwellings in temperate climates***. Buildings and Cities, 2(1), pp. 487–494 (2021). Doi: <https://doi.org/10.5334/bc.128>

Empowering and protecting people

- Think about the elderly

Intuitive windows and blinds. Simple, not fiddly, locks and keys.
Accessible robust handles.

- Provide protection

Temperature monitoring and wireless, smart tech. alarms.

Legally-robust procedure for measurement to prove overheating
and seek remedial action.

- The future

In the future might we need cool rooms, a safe haven, in some
homes?

Useful sources of information: 1

- ANC & IoA. (2020). Acoustics, ventilation and overheating, residential design guide. Acoustics and Noise Consultants (ANC) and Institute of Acoustics (IoA).

Provides advice, supported by detailed analytical methods, to enable design and retrofit and passive control of overheating. Limiting the effects of noise.

- CIBSE. (2013). Limits of thermal comfort: Avoiding overheating in European buildings (TM52).

Explains the principles behind adaptive thermal comfort and overheating criteria now used to underpin many subsequent guidelines and standards. Modelling advice in TM59.

- CIBSE. (2018). Good practice in the design of homes (TM60).

The principles of designing new dwellings to avoid overheating A useful checklist of the common causes of overheating and mitigation measures.

Useful sources of information: 2

- GHA. (2019). Overheating in new homes tool and guidance

Focus is early stage design. Risk scoring method. Mitigation measures illustrated.

- Mayor of London. (2018). Energy, overheating and daylight in tall buildings study (Local Plan Supporting Study).

Planning requirements for large developments to be assessed for overheating risk. Illustrates tall buildings are at risk and measures to mitigate overheating.

- Passivhaus Trust. (2016). Designing for summer comfort in the UK.

Provides advice focused specifically on Passive Houses. Provides a checklist of risks, remedial actions See also Passive House Institute website.

- ZCH. (2016). Solutions to overheating in homes.

Thorough treatment of measures to mitigate overheating in new dwellings and refurbishments. Many other useful ZCH document.

The end

Thank you