OVERHEATING IN HOMES
THE BIG PICTURE
FULL REPORT
LIVING ROOM

• East London
• Fourth floor
• Flats above and below
• South-facing
• Large patio windows
• No shading by balconies above
• No trees or vegetation
• Seduced by marina...

My flat overheated in the summers of 2013 and 2014
BEDROOM

- North-facing
- Two windows!
- Un-shaded, but light coloured blinds
- Tilt and turn
- Busy main road all night
- Fire doors prevented cross ventilation
- Centralised MEV

Too noisy to open windows
South East of England, Urban, Dense
**Summer 2013**

- Warmest summer in the UK since 2006, but not exceptionally so (0.8 °C above long-term average)
- June was relatively cool
- Heat wave from 3 to 22 July

**Summer 2014**

- The UK mean temperature was 0.5 °C above the 1981-2010 average – so not as warm as summer 2013.
- June and July were both warmer than average, but it was the coolest August since 1993.
- No heat waves

*Source: Met Office*
EPC rating of D, over-occupied, corridors fine

This home's performance is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO₂) emissions.

The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.
What was going on?

• The combination of high solar gains and the urban heat island effect meant the flat was continuously exposed to high temperatures.

• The lack of effective day or nighttime ventilation will make it difficult for the high internal temperatures to be reduced easily.

• Internal temperatures built day on day
In summary - problems arise when we struggle to prevent unwanted heat entering the home, or struggle to get rid of it e.g. when...

**Sources of heat gains - External**
- Un-shaded, large windows hit by late afternoon sun
- No other forms of solar protection e.g. films or blinds
- Warm air from outside (when very hot)
- Window openings above hot air vents bringing in warm air

**Sources of heat gains - Internal**
- Appliances and electrical gadgets turned on and kicking out heat
- MVHR units not switched to summer bypass, pumping out hot air
- Hot water distribution pipes
- HIUs acting like radiators
- Heat in the building’s mass is not released due to high external temperatures

**Inability to purge excess heat**
- Small window openings not letting in enough air
- Windows fixed shut
- Openable windows on just one side of the building
- Windows not opened due to noise, security concerns
- Over reliance on MVHR/MEV to provide purge ventilation
How common is our experience 1?

• New-build, suburban, built post 2000

• Living rooms and bedrooms overheating in spring - autumn

• Solar gain from windows, plus lack of ventilation due to limited areas of openable windows

• 10% openable, 90% not openable

• Vulnerable occupants aged between 55-85

• Resident complaints – some refused tenancies

• Solutions included solar reflective film on the windows, caretaker opens the windows at either end of the corridors

GHA - There are many, many similar case studies
ZCH Survey 2014 - 53 out of 75 housing providers surveyed reported at least 1 instances of overheating in the last 5 years

Of those that reported instances of overheating, where did they operate?
How common is our experience 2?

Beizaee et al (2013)
- Nearly 200 unheated homes throughout England monitored during the summer of 2007
- Relatively cool summer
- 21% of bedrooms exceeded 26°C for more than 1% of night-time hours
- 47% of bedrooms exceeded temperatures of 24°C for more than 5% of night-time hours

Yorkshire and Humber
- 10 properties (out of 193)
- No living rooms overheated
- 20% of bedrooms exceeded 26°C for more than 1% of night-time hours
- 40% of bedrooms exceeded temperatures of 24°C for more than 5% of night-time hours

CCC – “Up to 20% of homes may already be overheating, even in relatively cool summers”
Could overheating become more commonplace 2?

- UKCIP projections indicate that the climate is likely to continue to become warmer, with a likely increase of 1.48°C by 2080.

- Even a 1.48°C rise in average summer temperatures appears to put the majority of existing buildings at some risk of overheating (assessed with the SAP overheating check).

- Certain adaptive measures would improve significantly the resilience of the stock and reduce vulnerability to a warming climate.

- These must be considered in conjunction with attempts to mitigate GHG emissions from dwellings.

UCL (2013)
What could we have done?

- We didn’t think to ask the landlord about temperatures
- I asked for the EPC though...
- We never complained...I assumed there was nothing the landlord could do
- But we did report other issues without thinking e.g. boiler issues

What could landlord have done?

- Better external shading?
- Solar films on windows?
- Better curtains with solar reflective lining?
- Advised us about window opening patterns?
- Turn off electrical equipment?
- Fans to aid night cooling?
Minimising overheating

Balance heat gains and losses, otherwise you get unwanted heat

**Losses:**
- Through the fabric = small
- Ventilation

**Gains:**
- External – Solar, warm air
- Internal – People, appliances, services

**Aim to limit heat gains and provide adequate, secure ventilation (especially at night)**

Thermal mass can help smooth out temperature swings
How did Housing Providers find out they had an overheating problem?

For those who reported experiencing overheating problems in their stock, how did they find out there was a problem?

- Through un-solicited customer feedback / complaints: 41%
- Through monitoring in the building or other post occupancy work: 10%
- Through our building / site managers reporting problems: 31%
- Through customer surveys which specifically ask a question(s) about thermal comfort / overheating: 6%
- Through customer surveys which do not specifically ask a question(s) about thermal comfort / overheating: 6%
- Other (please describe): 6%
- I don’t know: 0%
Figure 29.
Does your organisation have a method or process to assess the risk of your residential properties overheating?
(Number of respondents out of 74 responses)

- Yes: 36%
- No: 59%
- Don’t know: 5%

Do Housing Providers carry out overheating risk assessments?
Are housing providers checking for delivery of intended measures?

Figure 32.
Types of process used to ensure that measures to mitigate the risk of overheating are implemented
(Total number of individual respondents = 72)

- No process in place
- General quality control
- Other
- Building control inspections
- A specific person responsible for ensuring overheating mitigation measures are properly implemented
- Quality control process specifically covers overheating
- I don't know
- Not applicable

NUMBER OF RESPONSES
“The Government will consider potential research to understand better what an overheating standard might look like and the options to help industry and others address the risks.”

15 October 2015
Zero Carbon Hub - Phase 2

• By March 2016 – Progress on the definition of overheating (national level)

• By March 2016 – Progress at a practical level on overheating risk management (organisational level)

• TBC November 2015 onwards – Analysis of policy options and cost/benefit analysis (national/local level)
In the meantime there is plenty guidance available!
Site 1

**Construction** - Traditional Build

**Ventilation system** – System 3 – MEV

**Size of site** – 2 phases – 129 plots

**Design** – Manufacturer – Designs then transferred onto working drawings issued by the developer at working drawing stage

**SAP** – Stated System 3” for all plots with rigid ducting to ground floor, flexi to first where ducted to roof tile

**Installation** – Sub Contractor carpenter installed ducting to ground floor. First fix electrician installed all other ducting. Second fix electrician installed fans and sets them up

**Commissioning** – There was no evidence of commissioning air flow rates. Electrical Contractor set the fan speeds by ear, but did not adjust to meet any particular air flow
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