Updates on Policy and Codes

Spaces Study Day, Manchester 2018

BREEAM 2018 – Key changes

Management

Health and Wellbeing

Energy

Transport

Materials

Waste

Land and Ecology

Pollution

CODE FOR A SUSTAINABLE BUILT ENVIRONMENT
BREEAM
BRE GLOBAL

BREEAM 2018 – Key changes

- Areas of change:
  - **Health and Wellbeing**: a review of issues to align with the WELL standard (https://www.wellcertifed.com/), but no other major changes planned.
  - **Ene03**: minimum lighting levels will be harder to obtain, requiring 70 lumens per circuit watt instead of 60.
  - **Wst01**: standalone credit for a pre-demolition audit. Rather than this being hidden within the resource efficiency credit, the efficiency benchmarks are also being reviewed.
  - **Wst05 Adaptation to Climate Change**: this requires solutions to be identified in RIBA Stage 2 and incorporated by RIBA Stage 4
  - **Pol02**: up to 2 credits (previously 3), this is based on the NOx emissions of space and water heating, depending upon the local air quality.

BREEAM 2018 – Wst05 Adaptation to Climate Change

- Exemplary credit

Table 10.11 Criterion 5 requirements

Issue	Requirements	Link to Wst 05 issue
Hea 04 Thermal comfort	Criterion 6	Prevent increasing risks of overheating.
Ene 01 Reduction of energy use and carbon emissions	A minimum of six credits	Maximise energy efficiency to tackle likely energy demand and minimise resultant carbon emissions.
Ene 04 Low carbon design	The passive design analysis credit	Maximise opportunities to avoid unnecessary carbon emissions.
Wat 01 Water consumption	A minimum of three credits	Minimise water demand in periods of drought.
Mat 05 Designing for durability and resilience	Criteria 2–4	Avoid increased risks of deterioration and higher maintenance demands.
Pol 03 Flood and surface water management	Flood resilience: a minimum of one credit Surface water run-off: two credits	Minimise the risks of increased flood risk and surface water run-off affecting the site or others.

BREEAM 2018 – Mat 01 & Mat 02

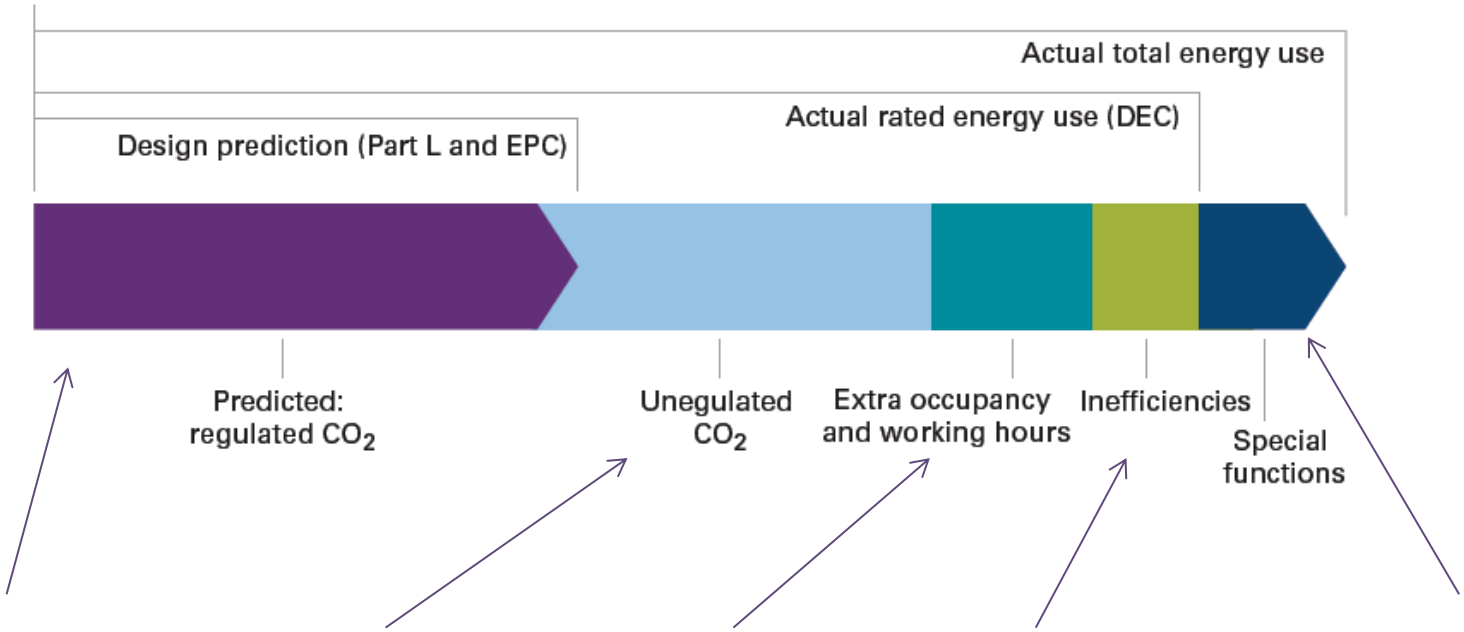
- Mat 01 Environmental impacts from construction products - Building life cycle assessment (LCA) and
- Mat 02 Environmental impacts from construction products - Environmental Product Declarations (EPD)
- Instead of basing credits on Green Guide ratings, credits are awarded on a life cycle analysis, rewarding proactive design teams for early involvement.

BREEAM 2018 – Ene01

- Simple buildings have
  - 9 credits available at design stage,
  - a further 4 credits are available if the developer completes additional energy modelling during design & PC.
- Requirement to undertake predicted operational energy consumption (POEC) modelling and analysis at both design and post-construction stages.
- Potential to deliver real energy and carbon emission savings by aligning predicted with operational benchmarks, rather than just relying on Part L regulated energy use predictions.

Performance Gap

Adapted from Carbon Buzz



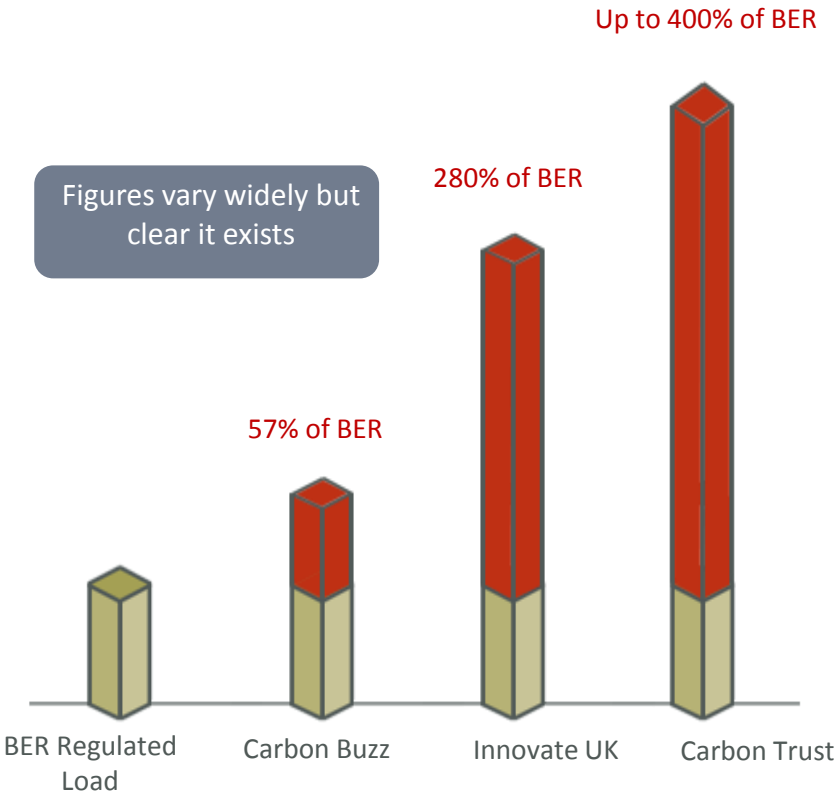
Regulated energy: heating, hot water, cooling, ventilation and lighting	Unregulated energy: plug loads, server rooms, security, external lighting, lifts, etc.	Extra occupancy and equipment operating hours: evening/ weekend working	Inefficiencies: Poor control, commissioning maintenance, etc	Special Functions: trading floors, cafeterias, etc

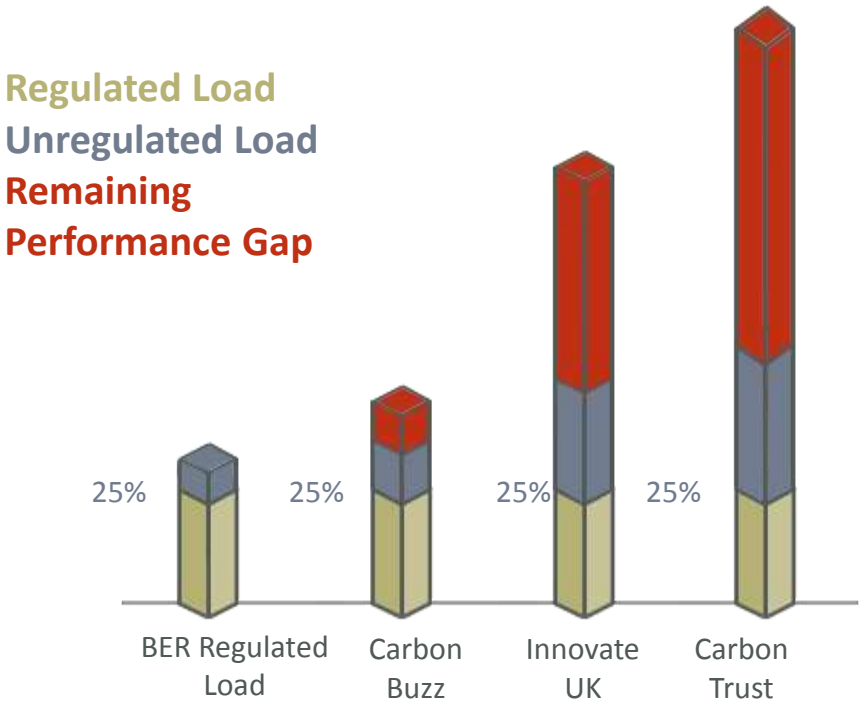
What is the magnitude of the gap?

Building Emissions Rate (BER) vs. actual in-use energy consumption

Unregulated load accounts for an average of 25% of overall energy use.

Goes up to 65% in offices





Minimum Energy Efficiency Standard (MEES)

Department for
Business, Energy
& Industrial Strategy

THE NON-DOMESTIC PRIVATE RENTED PROPERTY MINIMUM STANDARD

Guidance for landlords and enforcement authorities on the minimum level of energy efficiency required to let non-domestic property under the *Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015*

February 2017

Minimum Energy Efficiency Standard (MEES)

- As of 1st April 2018 MEES for commercially rented properties came into force across England and Wales.
- Landlords can no longer grant new, or renew existing, leases on any commercial property with a rating of F or G,
  - Unless they have proven to make all reasonable (i.e. cost-effective) energy-efficient improvements the building requires.
- Recent research has indicated that as much as 20% of the current building stock will fall short of these standards, equating to a staggering £130 billion in commercial property.
- From 1 April 2023, landlords must not continue letting a non-domestic property which is already let if that property has an EPC rating of band F or G

Minimum Energy Efficiency Standard (MEES)

- Opportunities:
  - Beginning to seen EPCs expire after initial 10 years validity
    - Check quality of existing EPC. It may be possible to achieve a rating of E or higher simply by recalculating
    - EPC rating may have decreased since improved building regulations
  - Using a software tool such as IESVE, it is even possible to run both DSM and SBEM calculation methods from the same platform, enabling a direct comparison of results to choose the option that delivers a more favourable outcome.
    - SBEM provides exactly what its name states – a Simplified Building Energy Model - and is merely a compliance engine, not a design tool.
    - DSM involves full annual simulation performed multiple times per hour using real hourly weather data. DSM offers more flexibility to model energy saving technologies to suit individual buildings.

Minimum Energy Efficiency Standard (MEES)

- Landlords may be exempt when:
  - Improvements are not cost-effective, i.e. simple payback greater than 7 years
  - Third party consent for improvements cannot be obtained (e.g. from a superior landlord, tenant or lender)
  - Improvements may decrease the value of a property by 5% or more, or where cavity wall insulation could damage a building
  - All relevant improvements are implemented, but the building still fails to achieve an 'E' rating
  - New landlords may be exempt for six months from the date of taking ownership of a property. All other exemptions are valid for a period of 5 years from notification.
- What are the penalties?
  - Fines of up to £150,000 can be enforced, which are dependent on the type of infringement and the length of non-compliance.

Minimum Energy Efficiency Standard (MEES)

	Category	Recommendation	Affected area	Cost	Savings	Discounted Payback period (yrs)	Saved kgCO₂/m²	Rating	MEES Exempt?
☑	Lighting	Replace T8 fluorescent tubes with LEDs (lamp)	136m²	£503 to £654	£328	1.6 to 2.1	5.55	G 194	✗
☐	Lighting	Replace tungsten lamps with LEDs (lamp and luminaire)	119m²	£7,878 to £10,242	£6,862	1.2 to 1.5	121	C 64	✗
☐	Lighting	Replace tungsten lamps with LEDs (lamp)	119m²	£2,036 to £2,648	£6,263	0.3 to 0.4	111	[illegible]	✗
☐	Lighting	Install lighting controls	136m²	£409 to £532	£300	18.8 to 28.1	0.52	G 200	✓
☐	HVAC	Replace existing local electric heating and/or air source heat pump with a new air source heat pump system	158m²	£7,278 to £9,461	£199	N.A.	3.52	G 196	✓
☐	HVAC	Replace boiler with high efficiency type	34.9m²	£142 to £184	£16.0	10.6 to 14.7	0.40	G 200	✓
☐	Misc	Replace local electric heating system(s) with gas fired, wet radiator system	64.9m²	£3,980 to £5,174	£254	23.1 to 36.3	3.62	G 196	✓

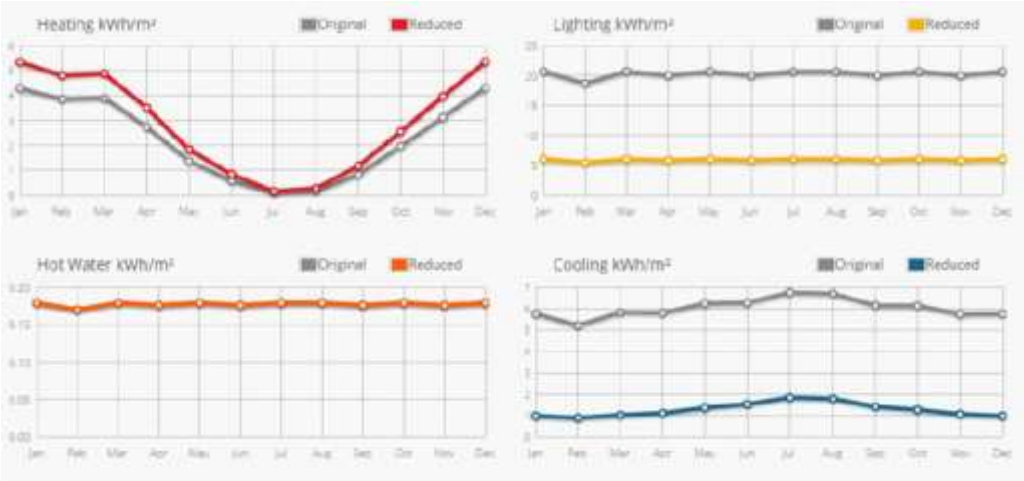


Table 6 Improvements that in ordinary circumstances are practical and economically feasible

Items 1 to 7 will usually meet the economic feasibility criterion set out in paragraph 6.5. A shorter payback period is given in item 8 because such measures are likely to be more capital intensive or more risky than the others.

No.	Improvement measure
1	Upgrading heating systems more than 15 years old by the provision of new plant or improved controls
2	Upgrading cooling systems more than 15 years old by the provision of new plant or improved controls
3	Upgrading air-handling systems more than 15 years old by the provision of new plant or improved controls
4	Upgrading general lighting systems that have an average lamp efficacy of less than 40 lamp-lumens per circuit-watt and that serve areas greater than 100 m² by the provision of new luminaires or improved controls
5	Installing energy metering following the guidance given in CIBSE TM 39
6	Upgrading ***thermal elements*** which have U-values worse than those set out in column (a) of Table 5 following the guidance in paragraphs 5.12 and 5.13
7	Replacing existing windows, roof windows or rooflights (but excluding display windows) or doors (but excluding high-usage entrance doors) which have a U-value worse than 3.3 W/m².K following the guidance in paragraphs 4.23 to 4.28
8	Increasing the on-site low and zero carbon (LZC) energy-generating systems if the existing on-site systems provide less than 10% of on-site energy demand, provided the increase would achieve a simple payback of 7 years or less
9	Measures specified in the Recommendations Report produced in parallel with a valid Energy Performance Certificate

MEES Funding

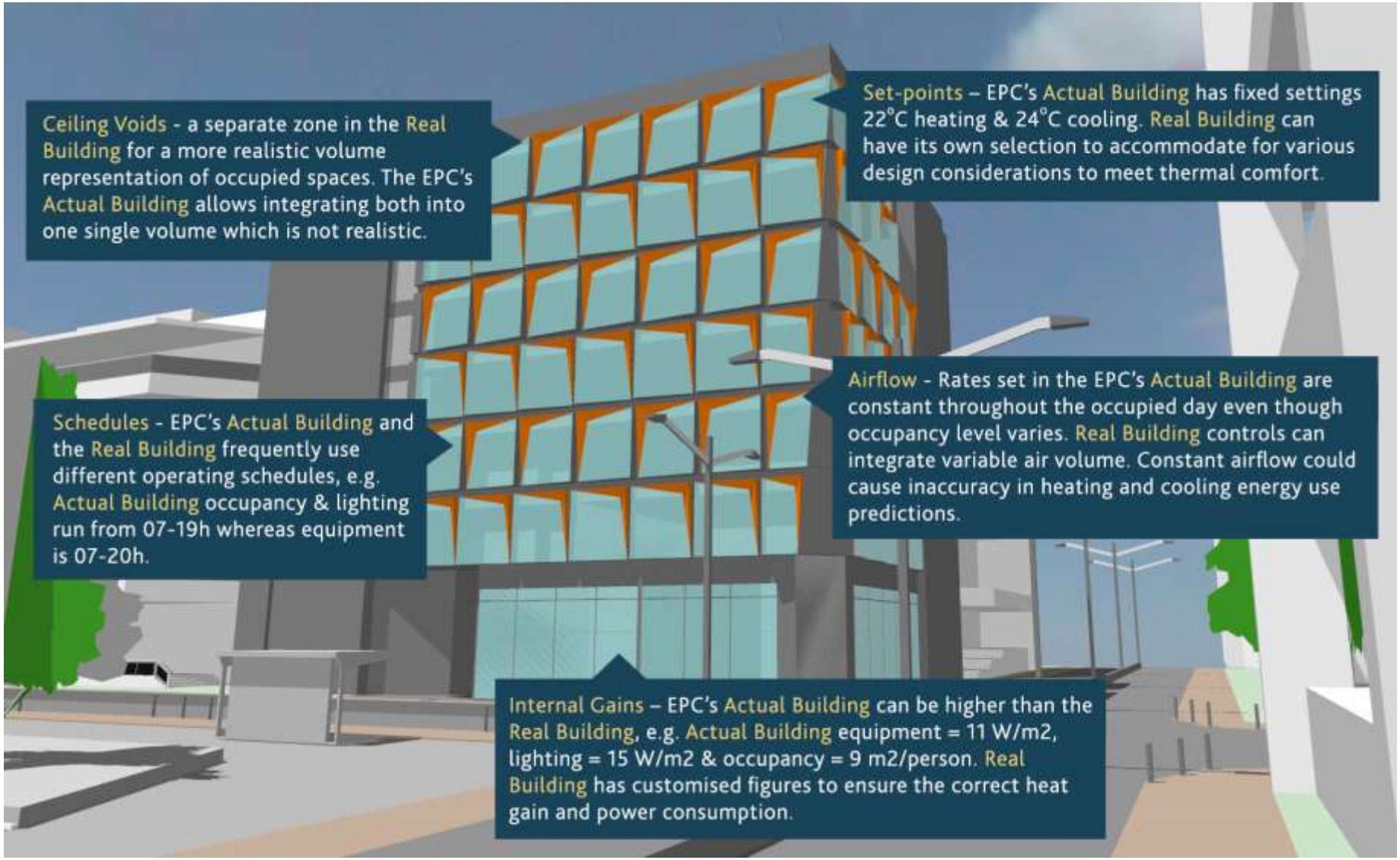
- The Government is committed to ensuring the regulations do not entail net or upfront costs to landlords for the required improvements.
  - Therefore landlords would be permitted to let a property below the minimum 'E' standard where the property has undertaken all those improvements that would meet the Green Deal's 'Golden Rule' – that the cost of the work, including finance costs, should not exceed the expected savings.
- This calculation would take into account any funding available through:
  a) Green Deal finance,
  b) ECO funding,
  c) Grant funding,
  d) A combination of these funding mechanisms.

- .

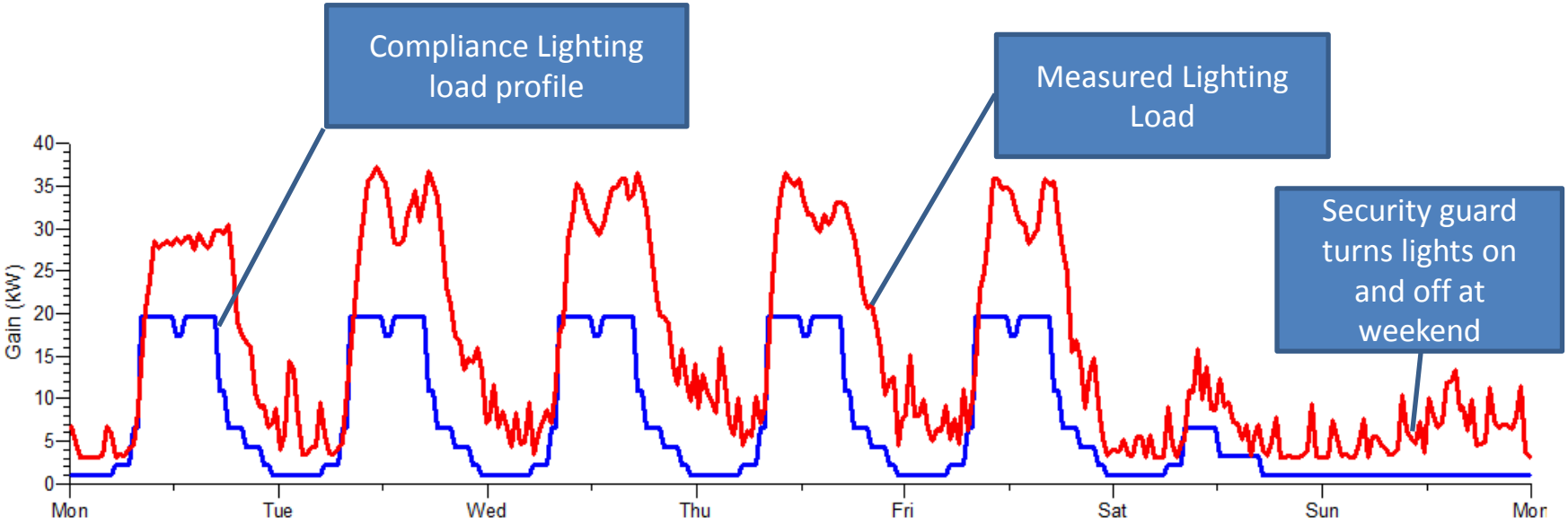
Minimum Energy Efficiency Standard (MEES)

- EPCs provide an important and required standard against which energy efficiency can be benchmarked, an EPC does not provide a true picture of a building's actual performance.
  - Significant gaps between predicted building performance, as outlined by an EPC, and actual building performance can exist.
- Care should be taken with respect to making decisions surrounding energy improvement options founded on an EPC alone
  - Need to avoid landlords could be led into making investments in their buildings that are unnecessary or do little to promote building energy efficiency in real world terms.

Minimum Energy Efficiency Standard (MEES)

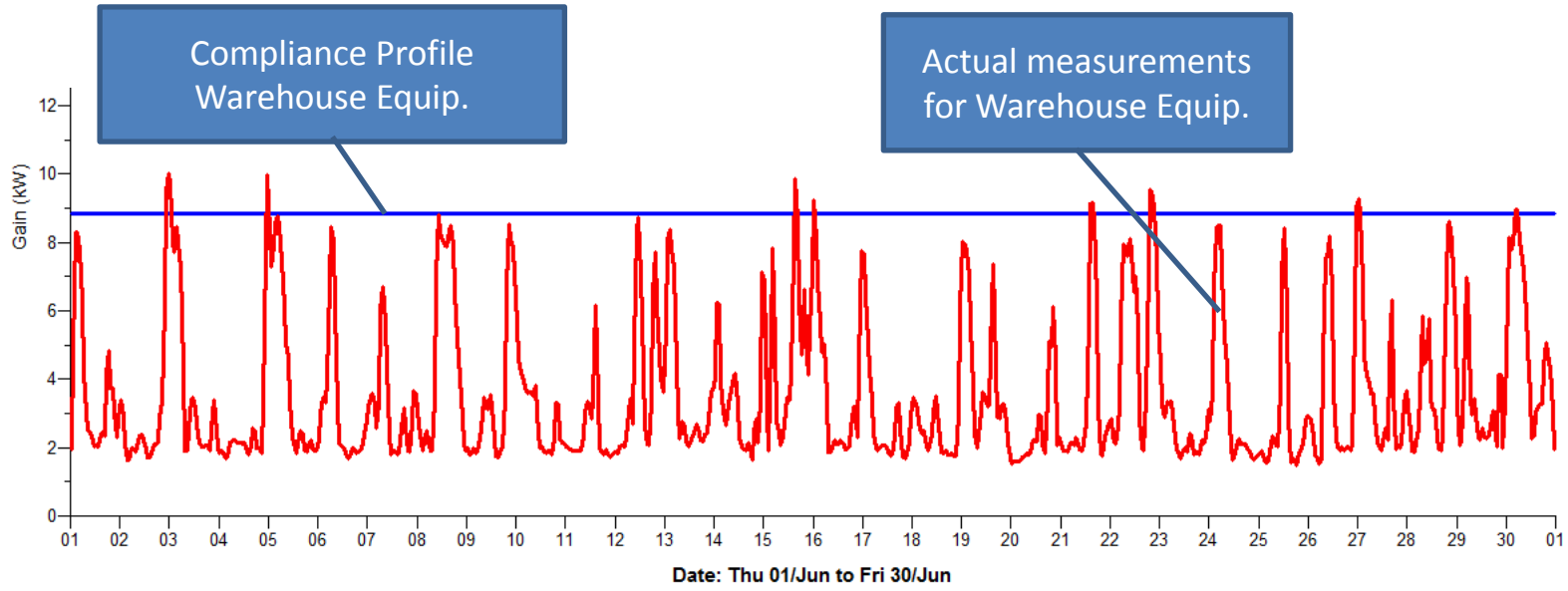


Warehouse: Lighting



- Annual lighting load based on Compliance lighting profile (blue) was **63.6 MWh**.
- Actual recorded lighting load (red) is **131.6 MWh**
- Affects heating / cooling

Warehouse: Equipment



- Annual equipment load based on Compliance lighting profile (blue) was **72.5 MWh**.
- Actual recorded equipment load (red) is **22.7 MWh**
- Affects heating / cooling

Current Practice – TM54

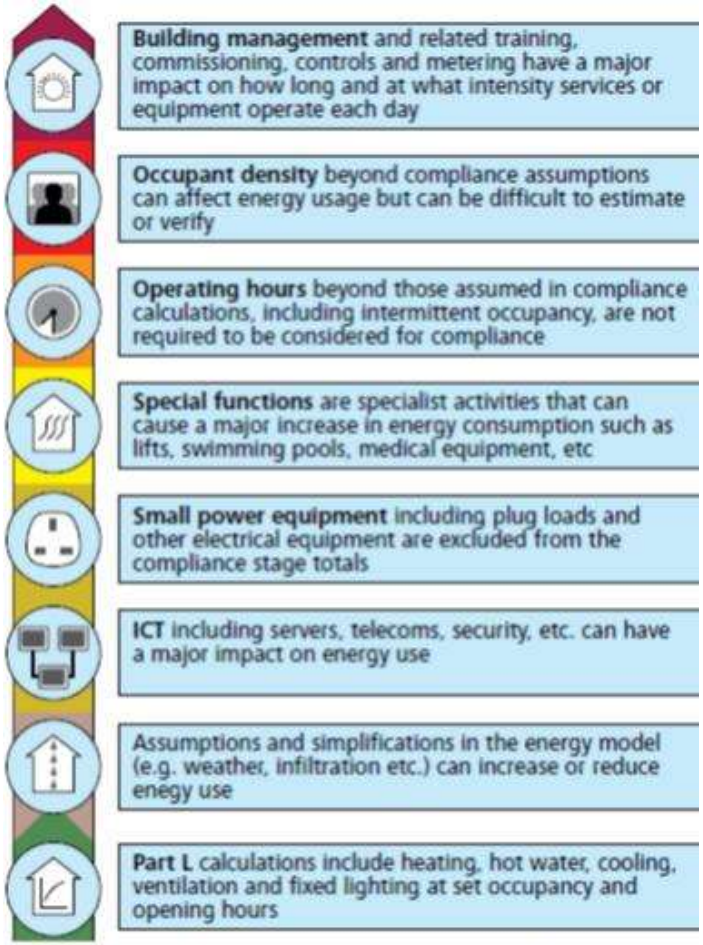


Figure 2 Reasons why Approved Document L2A compliance calculations differ from operation energy use (based on a CarbonBuzz diagram (http://www.carbonbuzz.org))

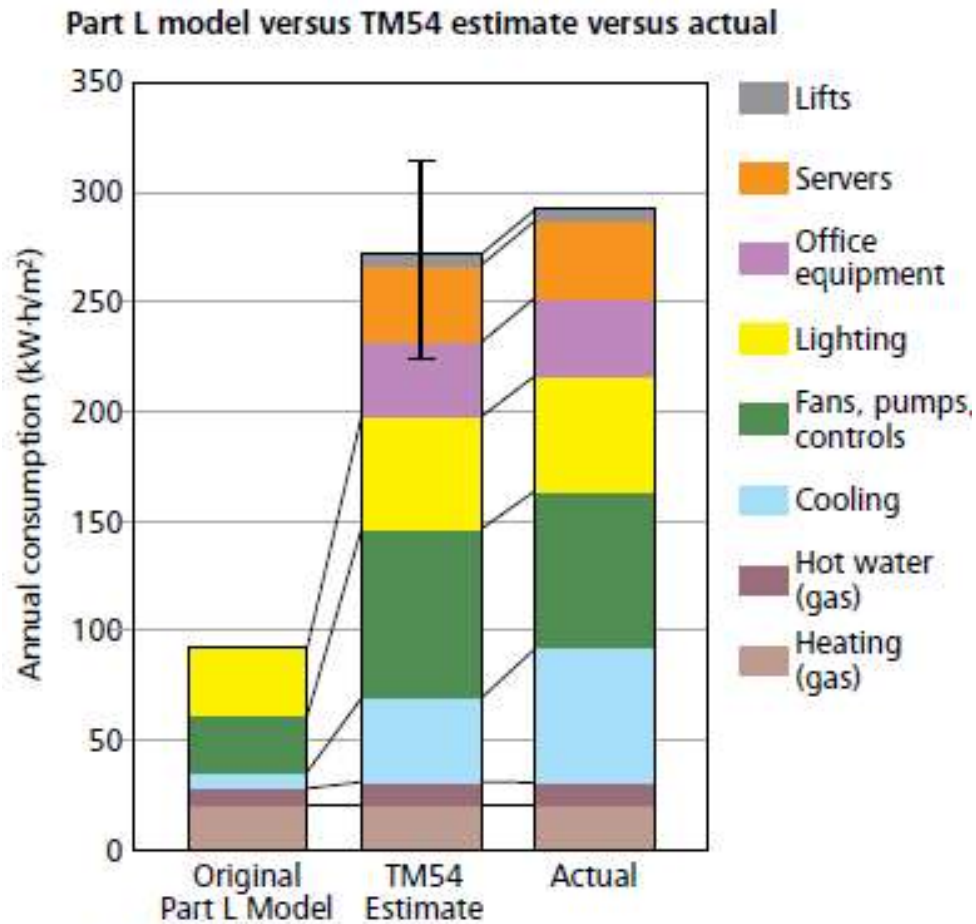
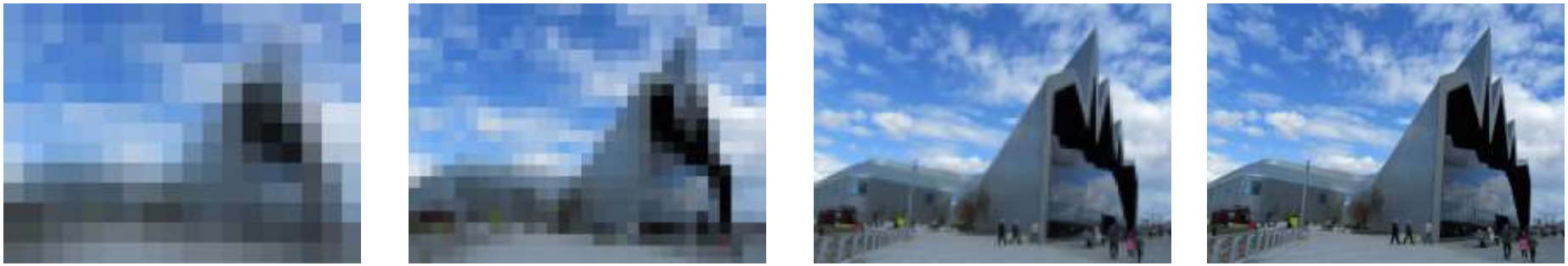
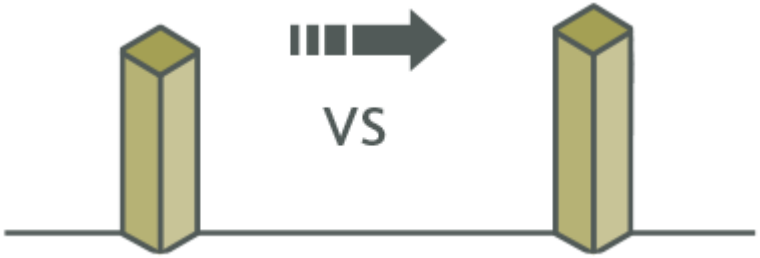


Figure 3 Results of applying the methodology to the case study building

Using Data to build a complete picture



More data captured and managed
= clearer picture of your building's performance



Gap between predicted and actual performance can be closed to 5-10%

Building Bulletin 101

Department for Education

Guidelines on ventilation, thermal comfort and indoor air quality in schools

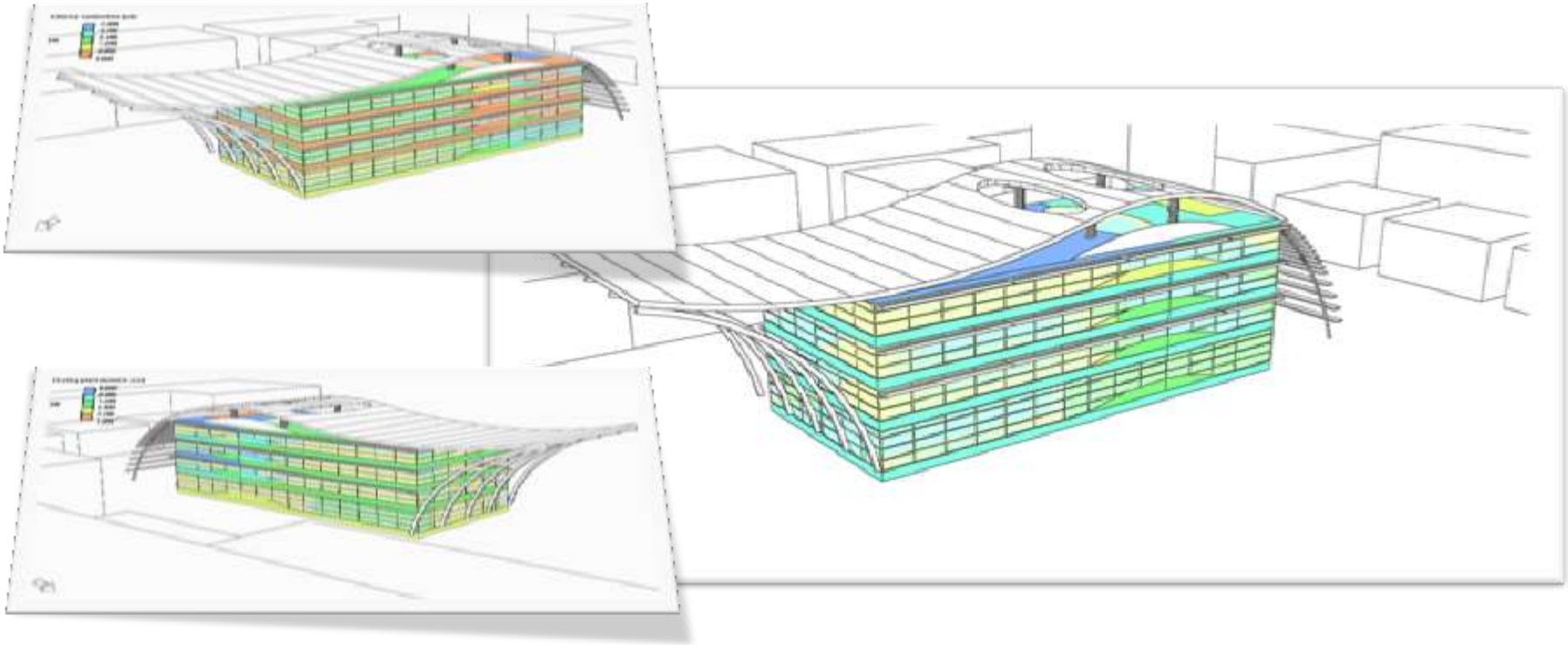
Building Bulletin 101

Draft for public consultation

June 2016

Building Bulletin 101

- The consultation closed on 6th September 2016.
- There are two key changes based on the draft BB101 proposal:
  - Indoor air quality: carbon dioxide (CO2) levels
  - Thermal comfort



Building Bulletin 101 – $C0_2$

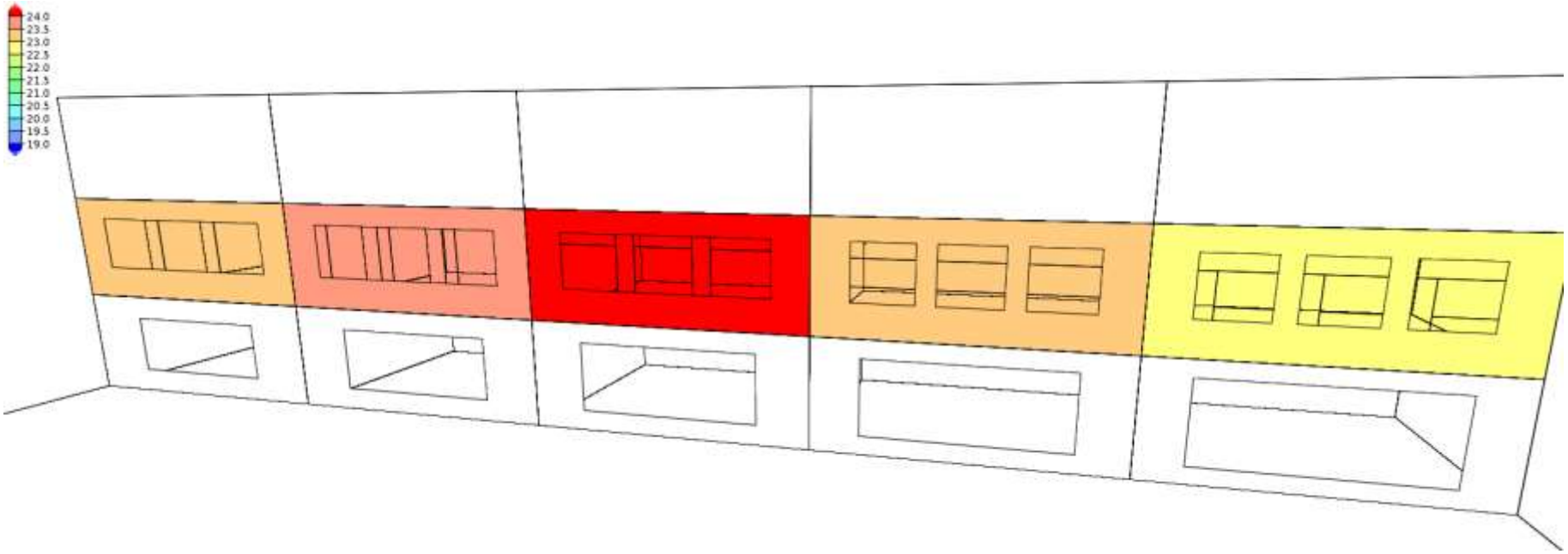
- Studies have suggested that the perfect CO_2 conditions for an average classroom would be 1200 parts per million (ppm) of CO_2 in a room.
- This level is not consistently achievable through natural ventilation and as such BB101 has set a limit of 2000 ppm.
  - Coupled with the risks of drifting from ideal temperature and humidity conditions, a drive toward better CO_2 control in the new consultation attempts to achieve better performance for optimised learning conditions.

Building Bulletin 101 – $C0_2$

- BB101 2006 regulations used the same rates whether the ventilation was natural, mechanical or hybrid to ensure that CO_2 levels never exceeded 1500 ppm:
    - Maximum litres per second per person of fresh air that needed to be supplied to a teaching space at any occupied time was 8 l/s/p.
    - A daily average of 5 l/s/p.
    - And never dropped below 3 l/s/p.
- The proposed BB101 attempts to find a better operational and commercial balance between the two very different ventilation strategies:
  - Naturally ventilated teaching
    - Average daily ventilation rate of 5 l/s/p.
    - Concentration of CO_2 less than 1500 ppm.
  - Mechanically ventilated teaching
    - Need to achieve a daily average CO2 concentration of less than 1000 ppm.
    - Typically achieved by supplying around 8–9 l/s/p of fresh air.

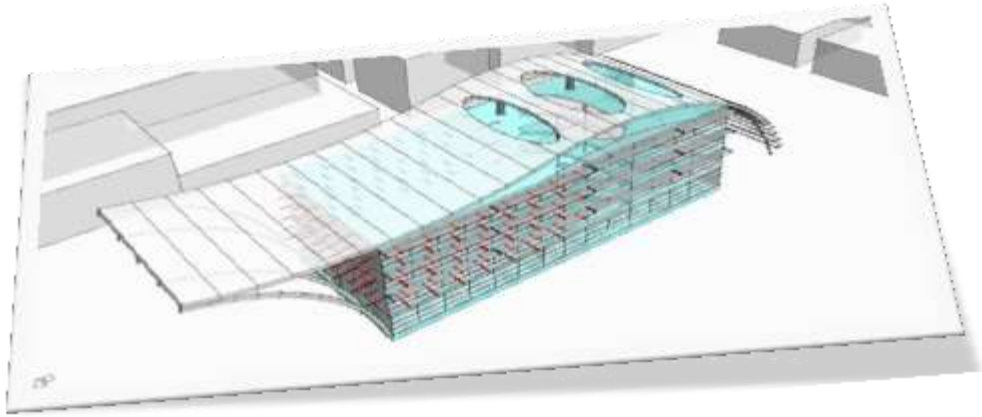
Building Bulletin 101 – Overheating

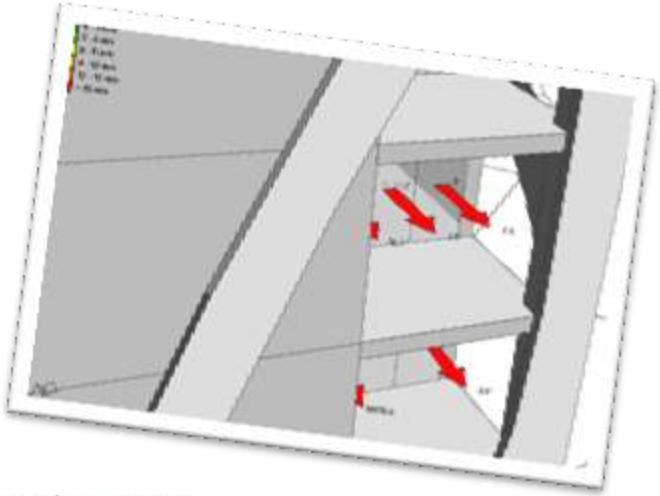
- Demonstrating that the classroom would not suffer from overheating was relatively easy to do under BB101 2006.
  - CIBSE TRY (Test Reference Year) weather data, instead of the much hotter DSY (Design Summer Year) weather data could be used for the simulation, generated concerns and has led to an emphasis on thermal comfort in the revised BB101 guide.



Building Bulletin 101 – Overheating

- Current BB101 criteria:
  - *These standards apply outside the heating season and are for the occupied period of 09:00 to 15:30, Monday to Friday, from 1st May to 30th September.*
    - There should be no more than 120 hours when the air temperature in the classroom rises above 28°C.
    - The average internal to external temperature difference should not exceed 5°C (i.e. the internal air temperature should be no more than 5°C above the external air temperature on average).
    - The internal air temperature when the space is occupied should not exceed 32°C.



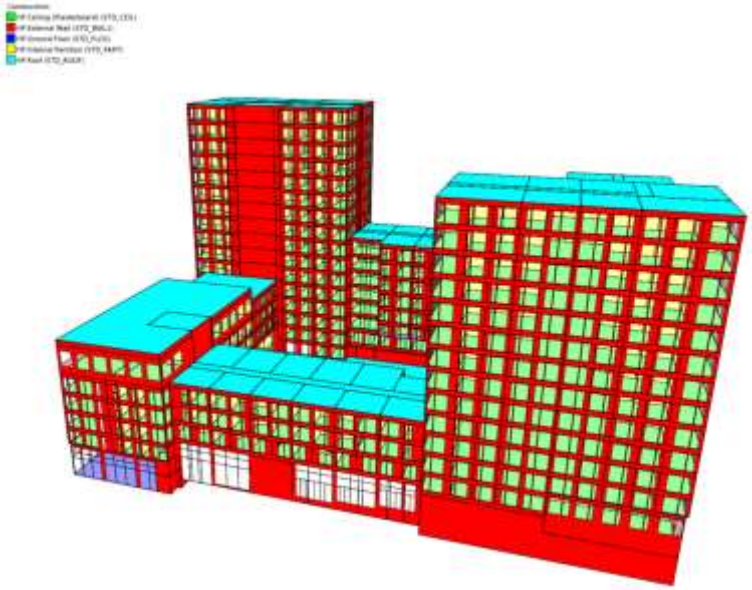


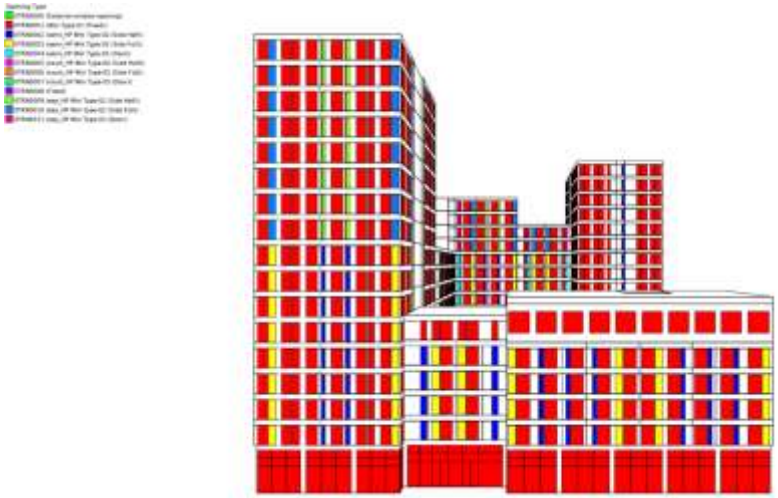
Building Bulletin 101 – Overheating

- In order to show that the proposed school would not suffer from overheating, two of these three criteria needed to be met.
  - The three criteria from CIBSE TM52 are:
    - Hours of Exceedance (*He*):
      - For schools, the number of hours (*He*) that DT is greater than or equal to one degree (*K*) during the period 1st May to 30th September for the defined hours shall not be more than 40 hours.
    - Daily Weighted Exceedance (*We*):
      - To allow for the severity of overheating, the weighted exceedance (*We*) shall be less than or equal to 6 in any one day.
    - Upper Limit Temperature (*Tupp*):
      - To set an absolute maximum value for the indoor operative temperature, the value of DT shall not exceed 4K.
- Recent Facilities Output Specification appears to required compliance with Criterion 1 only

Building Bulletin 101 – Overheating

Overall						
Passed:	241 rooms:					
Failed:	3 rooms:					
Unoccupied:	842 rooms:					
Data:						
Days data=	365	01-Jan	31-Dec			
Days (summer)=	153	01-May	30-Sep			
Data OK?	OK	Full summer				
Occupancy:						
Note:	This report assesses occupied periods only. Please be aware th					
	Use of educational NCM profiles may be seen as inappropriate					
	See Section 6.1.2 (a) of TM52 for further information.					
Passed:	241 rooms:					
Room Name	Room ID	Occupied	Criteria 1	Criteria 2	Criteria 3	Criteria fa
L00: A.G.01_Bedroom	RM000010	100	0	0	0	-
L00: A.G.02_Bedroom	RM00001E	100	0.3	6	1	-
L00: A.G.03_Bedroom	RM000022	100	0.3	6	1	-
L00: A.G.04_Bedroom	RM000019	100	0.3	6	1	-
L00: A.G.05_Bedroom	RM000020	100	0.3	6	1	-
L00: A.G.06_Bedroom	RM000017	100	0.3	6	1	-
L00: A.G.07_Bedroom	RM00001E	100	0.5	8	1	2
L00: A.G.08_Bedroom	RM00001D	100	0.3	6	1	-
L00: A.G.09_Living/Kitchen	RM000014	100	0	0	0	-
L00: B.G.01_Studio	RM00000F	100	1.3	15	2	2
L00: C.G.01_Bedroom	ST000009	100	0.2	6	1	-
L00: C.G.02_Bedroom	ST000008	100	0.3	6	1	-





Building Bulletin 101 – Summary

Issue	Current BB101			Proposed changes	
CO_2	Max. 8 l/s/p	Ave. 5 l/s/p	Min. 3 l/s/p	Natural • Average ventilation rate 5 l/s/p • Concentration <1500 ppm	Mechanical • Average daily CO_2 concentration <1000 ppm
Thermal comfort *(two of three to be met)*	• <120 hours of air temp >28 °C • Average internal to external temperature difference <5 °C • Internal temperature always <32 °C			• Number of hours (H_e) that *DT* is greater than or equal to one degree (K) during the period 1 May to 30 September for the defined hours <40 hours • Weighted exceedance (W_e) ≤6 in any one day • Maximum value of indoor operative temperature - value of *DT* <4K	

Bruce Elrick

bruce.elrick@iesve.com
T: 0141 945 8500
www.iesve.com