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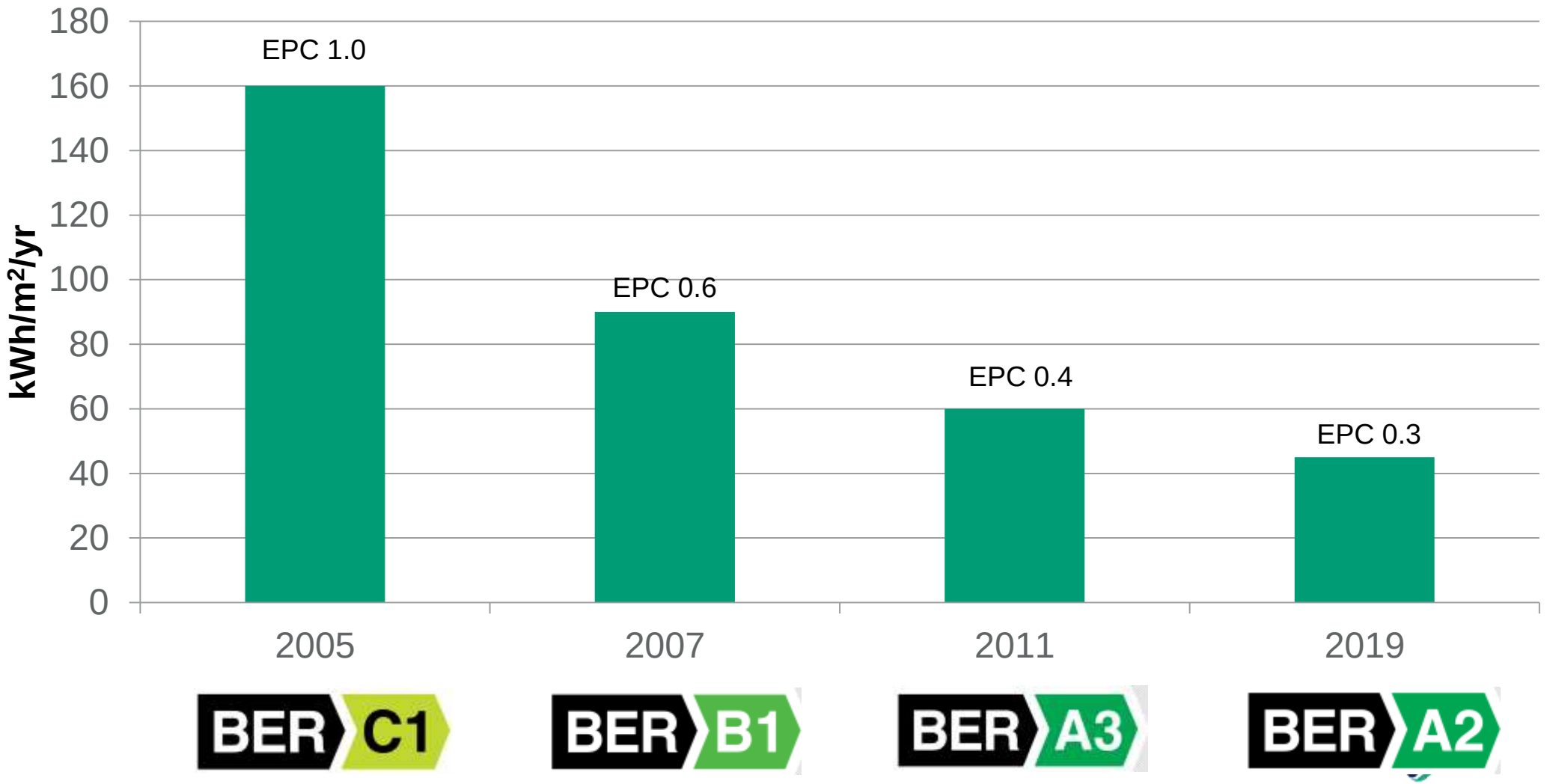
Legislation

Overheating Study on Residential Buildings

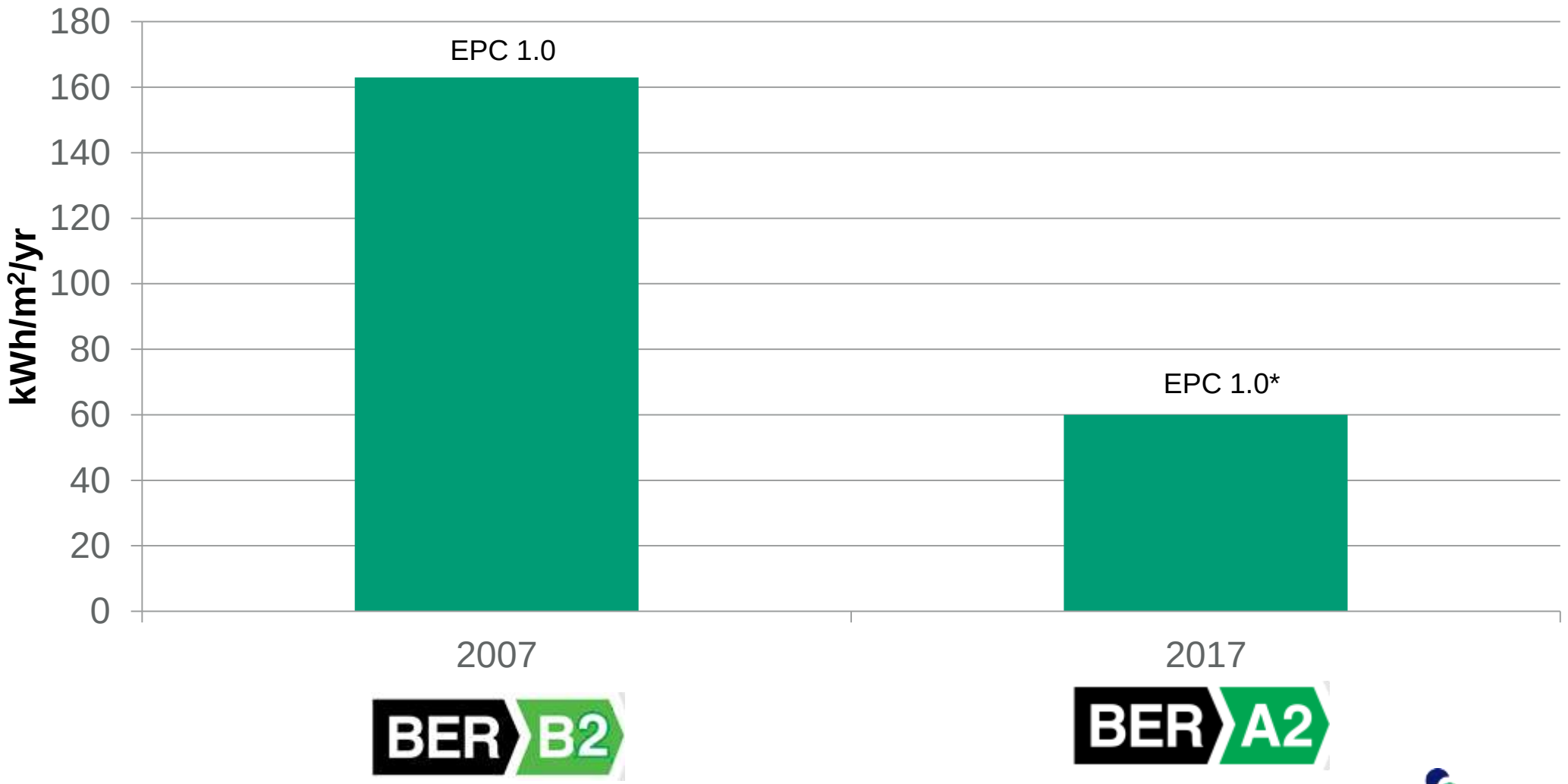
Research, Demonstration and Development Projects

Legislation

Residential – Semi Detached House



Non-Residential – Naturally Ventilated Office



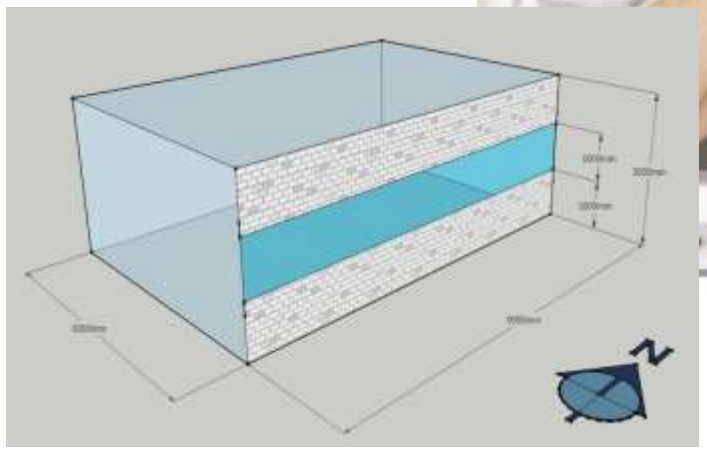
Typical Fabric Performance

Parameter	Part L 2019 Residential	Part L 2017 Non-Residential
Wall U Value	0.13 W/m2K	0.18 W/m2K or 0.27 W/m2K
Floor U Value	0.14 W/m2K	0.15 W/m2K or 0.25 W/m2K
Roof U Value	0.11 W/m2K	0.15 W/m2K or 0.16 W/m2K
Window U Value	0.9 W/m2K	1.4 W/m2K G Value 0.4
Air Permeability	5 m3/hr/m2 or 3 m3/hr/m2	5 m3/hr/m2 or 3 m3/hr/m2

Implementation through Non-Domestic Regulations

- Overheating Calculation for Naturally Ventilated
  - Simple Check in Compliance Tool or
  - Dynamic Thermal Modelling for Complex Buildings

- Solar Gain Check
  - East facing
  - Full width glazing to a height of 1m
  - g value of 0.68
  - Frame factor of 10%



Overheating Study on Residential Buildings

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Do new homes with advanced thermal performance tend to overheat?

- Are certain dwelling types more prone to risk of overheating?
- Which design features most influence the risk?
- What is the sensitivity to weather data?
- What type of interventions can help mitigate the risk?
- Is there scope/ need to refine existing tools to adequately capture the risk?

Modelling parameters and assumptions

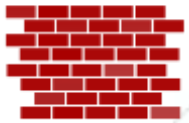
Future weather data – DSY1 2020s High emissions scenario

Daytime occupancy in all rooms

Internal gains (lighting, equipment) as per TM59

18°C set point for heating excl. June, July and August

Fabric thermal performance as per TGD L 2018



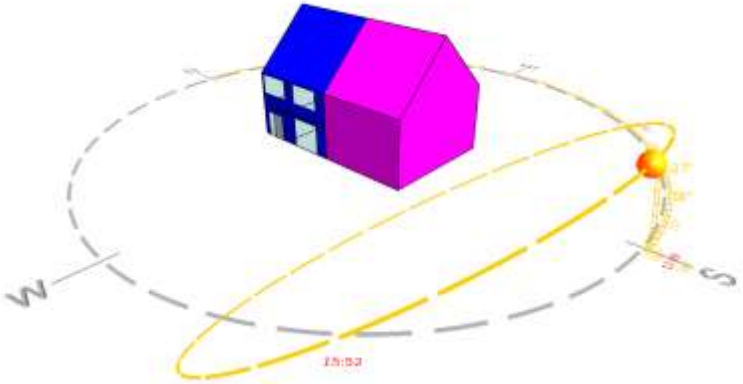
Medium thermal mass, masonry construction

Windows in occupied rooms start to open when internal temp >22°C, fully open when >26°C

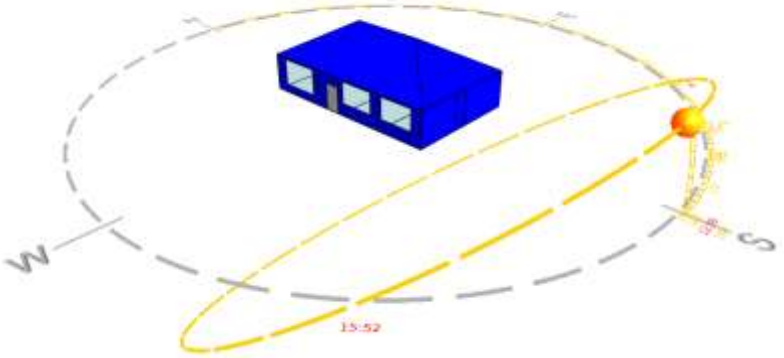
Openable area 1/20th of floor area for habitable rooms

Modelling parameters and assumptions

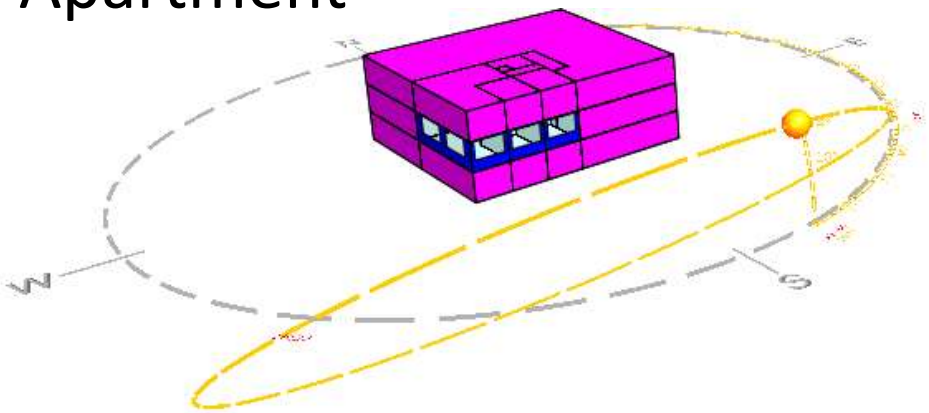
Semi detached house



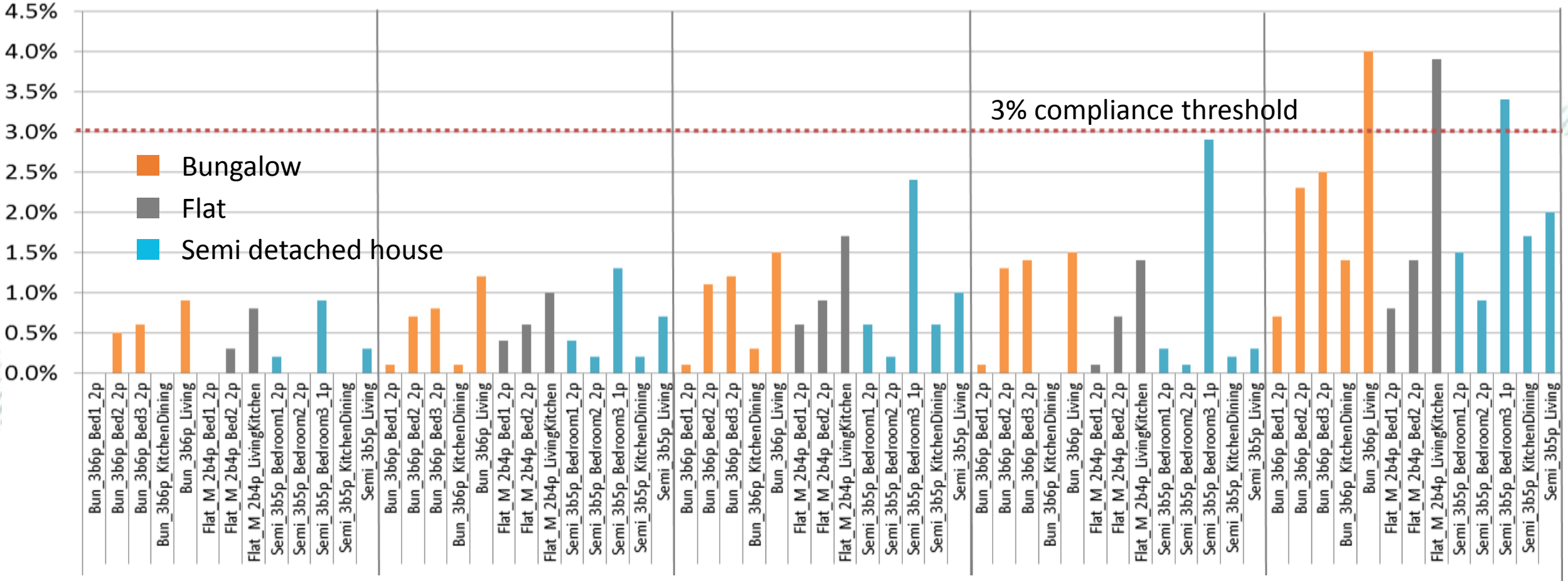
Bungalow



Apartment



Overheating risk - Weather data – Criterion A



Belfast DSY1 2020 High (base case)

Belfast DSY1 2050 High

Belfast DSY2 2020

Dublin 89

Manchester DSY1 2020 High

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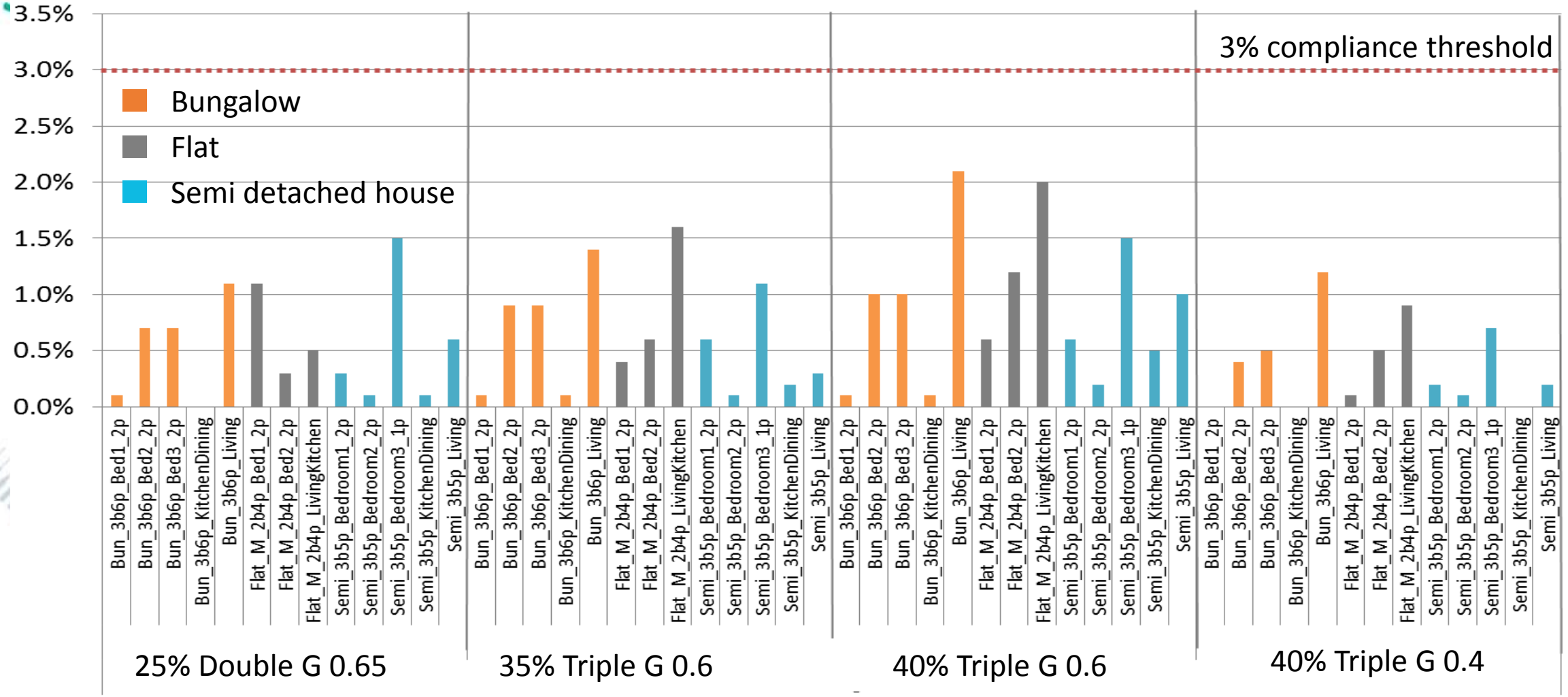
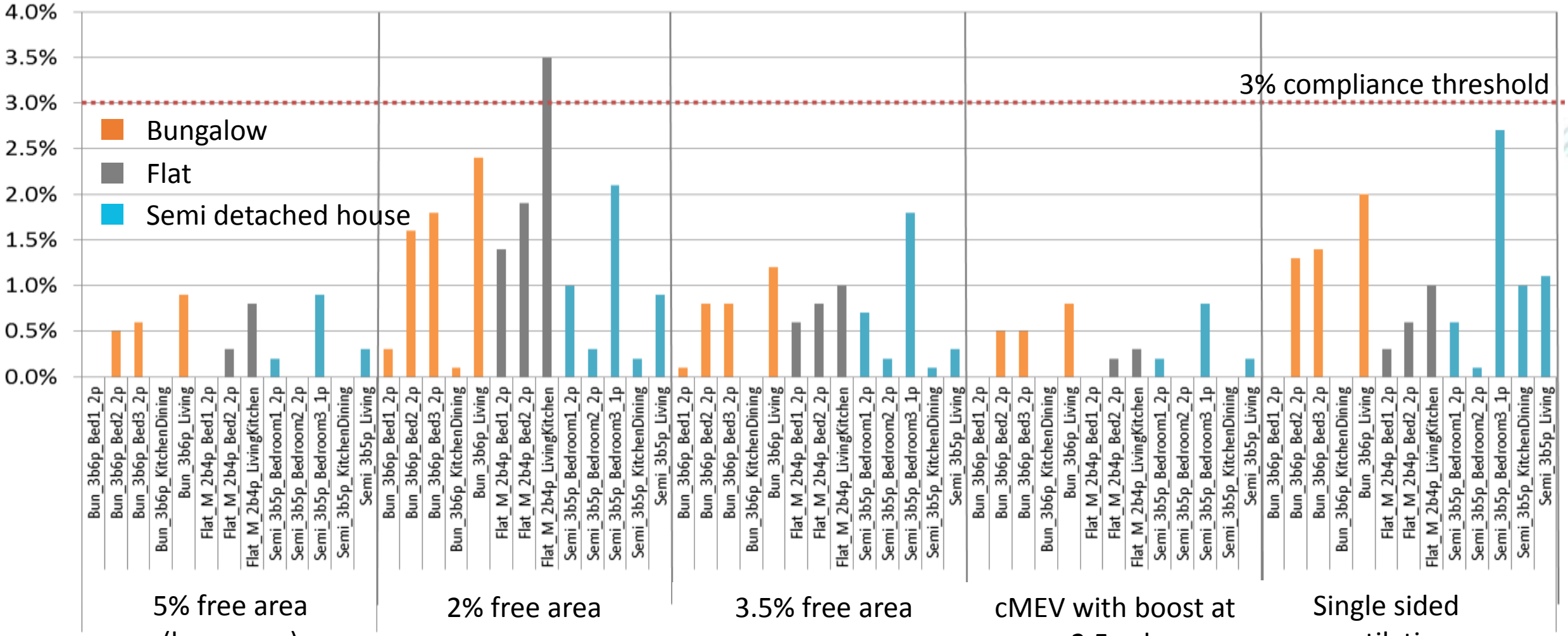
Overheating risk – Glazing – Criterion A



Overheating risk –Ventilation – Criterion A



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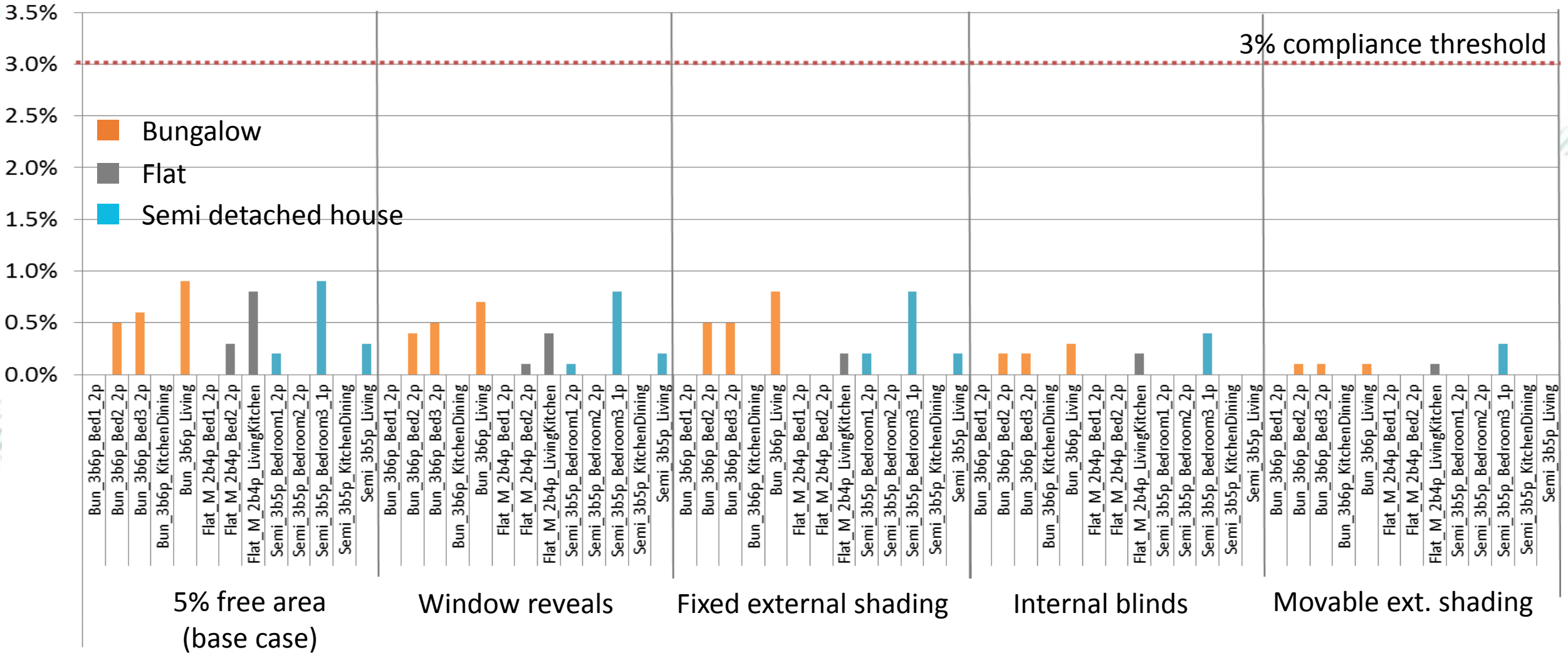
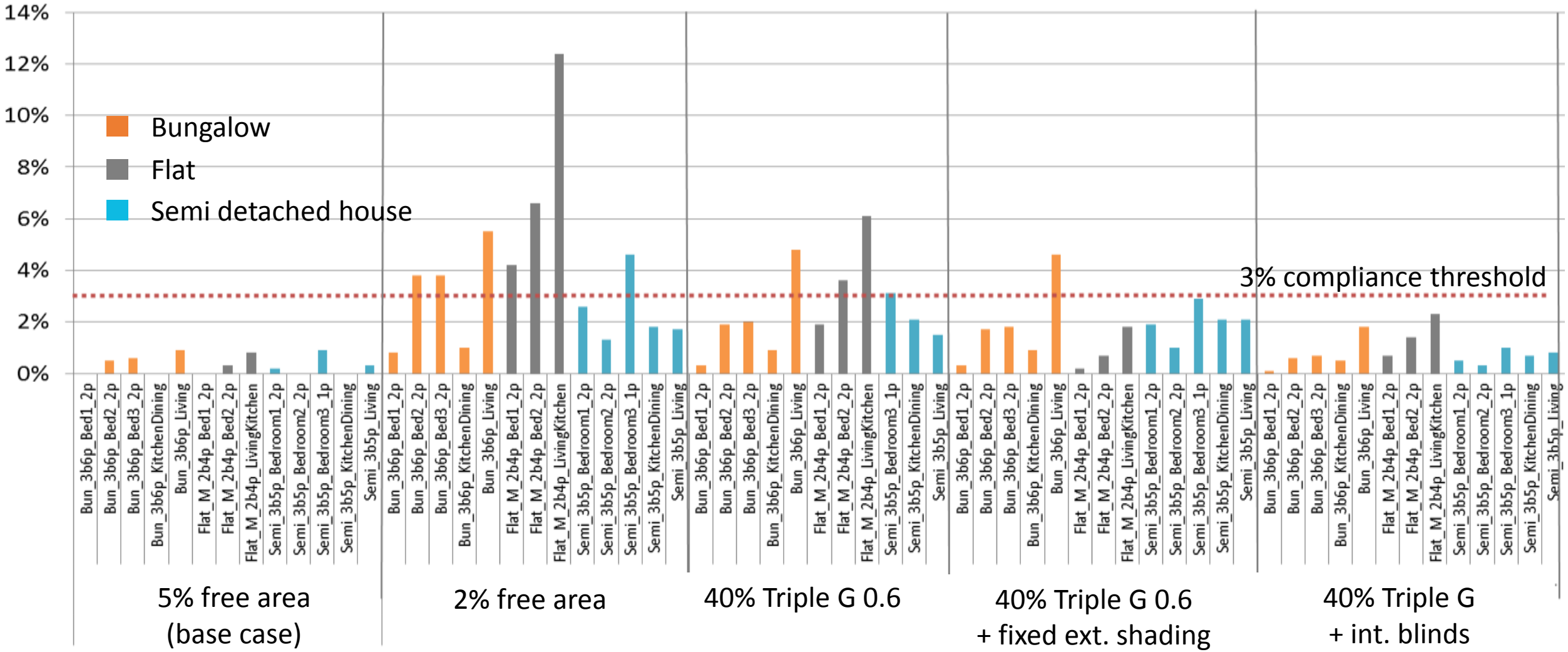
Overheating risk – Shading – Criterion A



Overheating risk – Combined – Criterion A



Belfast DSY2 2020 + single sided ventilation

Summary

- Modelling of 2018 fabric standards using future/current weather data highlights the need to consider overheating risk in new build design
- Key parameters to consider
  - Net solar gains (glazed areas, window g-value, shading)
  - Ventilation rates (window opening areas; ability to cross-ventilate)
- Choice of weather data – fit for purpose over a significant proportion of the building life; build resilience
- Aggregated impacts are critical!

Research, Demonstration and Development Projects

Assessment Methodology Building Energy Ratings (AMBER);

- **Total Project Cost:** €416,062
- **Funding Agency:** SEAI
- **Year Funded:** 2018
- **Lead Organisation:** Trinity College, RIAI, IES

Aspects Include:

"The AMBER project aims to provide a set of guidelines to minimise the performance gap in A-rated buildings, complemented by design best practices and user comfort and wellness recommendations."

"The project will collect BER and sensor data from 100 domestic and 25-40 non-domestic A-rated buildings, to analyse power loads and indoor environmental quality at 5 minute resolution for one year in each building, taking into account the differences in use and operation of different building types."

"*Energy and IEQ data will be paired with post-occupancy surveying to carry out a set of in-depth analyses, and made available to SEAI via dashboards for 12 months after the project."*

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VALIDate to assess of the effectiveness of the ventilation system in 'A' rated dwellings

- **Total Project Cost:** €271,326
- **Funding Agency:** SEAI
- **Year Funded:** 2018
- **Lead Organisation:** NUI Galway

Aspects Include:

The purposed project is a longitudinal study aimed at conducting multi-zone indoor environmental quality monitoring in 100 'A' rated energy efficient Irish residential dwellings. The project will monitor environmental quality (temperature, humidity, CO2, radon and VOCs) over two heating sessions and a cooling season.

nZEB_101

- **Total Project Cost:** €321,011
- **Funding Agency:** SEAI
- **Year Funded:** 2018
- **Lead Organisation:** University College Dublin

Aspects Include:

“Building on an established monitoring project of low-energy dwellings which has been running for over two years, the vision for nZEB101 is to uncover the key nZEB design and operations lessons as Ireland embarks on the unprecedented mass market implementation of these low-energy buildings.”

“nZEB101 monitors over 101 geographically dispersed domestic and nondomestic, new and retrofit properties and ensures a statistically robust sample size which will yield; Operational performance of A rated buildings, including energy and Indoor Environmental Quality (IEQ);”

Deep Energy Renovations bring improved energy performance but what impact does this have on indoor air quality.

- **Total Project Cost:** €204,533
- **Funding Agency:** SEAI
- **Year Funded:** 2018
- **Lead Organisation:** NUI Galway

Aspects Include:

"measure the air concentration of ten priority pollutants for health in 20 homes participating in SEAI's DR Pilot programme, before and after deep energy renovations"

"The data will also help SEAI understand and address information barriers to the adoption of energy efficiency measures, specifically related to the impact of deep renovations on occupant comfort and air quality in the home. This research will also make a significant contribution to international building energy research."

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Questions

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The Sustainable Energy Authority of Ireland is partly financed by Ireland's EU Structural Funds Programme co-funded by the Irish Government and the European Union.