FUTURA BRIGHT

SHAPING A SUSTAINABLE FUTURE

Navigating

Approved Document O

Overheating Regulations

Introducing our speakers

Iain Turrell
Director

BSc Sustainable Design and Environmental Management

MSc Architecture and the Environment

BREEAM Assessor and PassivHaus Designer

15+ Years Experience

Harry Notter
Senior Sustainability Consultant

Technical Lead

CIBSE Low Carbon Consultant

Level 5 Non-Domestic Energy Assessor

Ziaul Hoque
Sustainability Consultant

MSc Mechanical Engineering

Overheating & Thermal Load Specialist

Who are Futura Bright?

We work with a wide range of end clients and provide packaged solutions that are unique and tailored to meet each client's needs.

By working closely with our Building Services Engineering team, we are able to appreciate the technical feasibility of proposed systems. We pride ourselves in offering solutions that are not only sustainable, but cost effective and technically viable. Our services cover every stage of a project, from planning applications all the way through to post occupation.

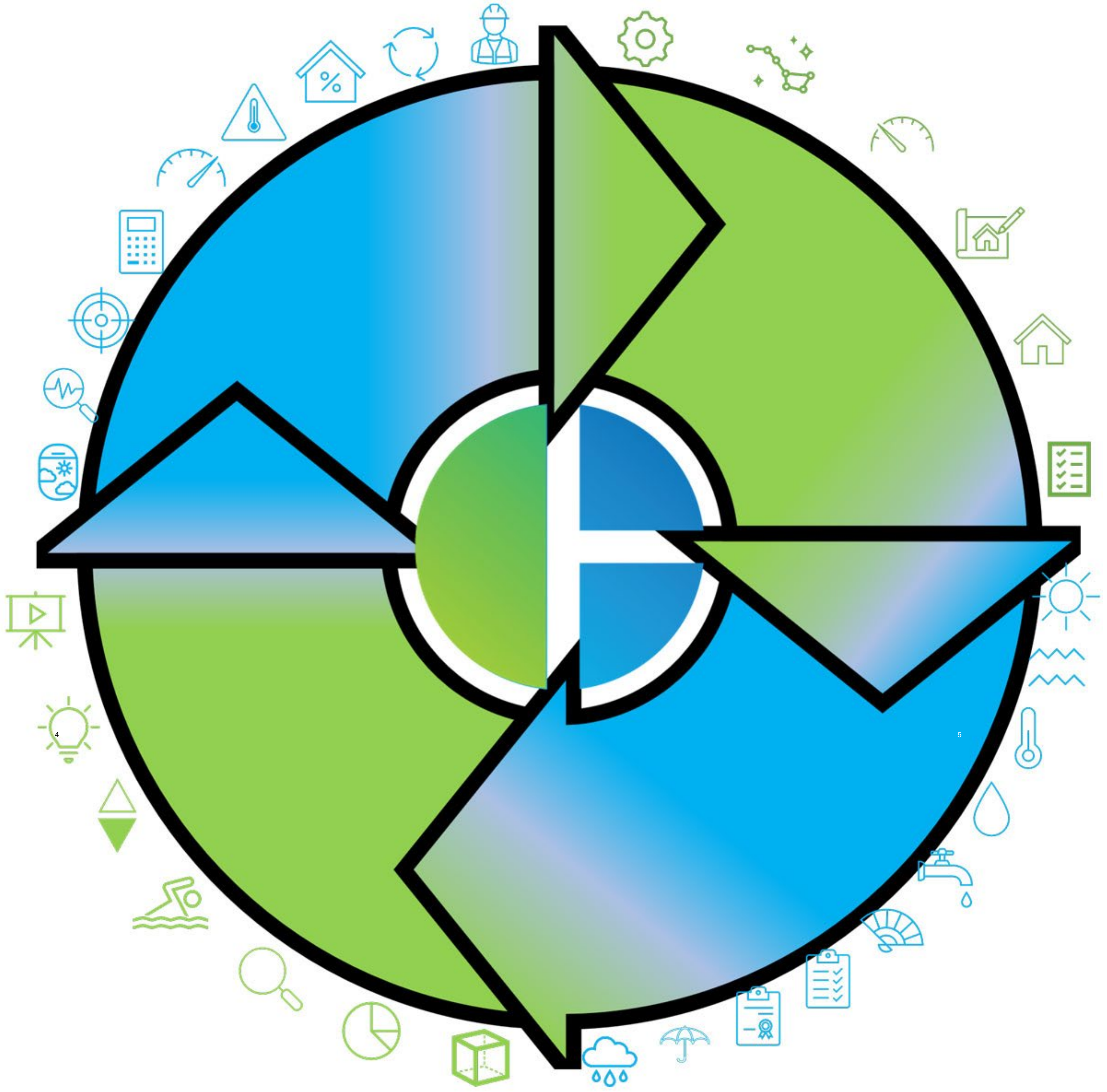
Our Sustainability Team have extensive knowledge of building sustainability measures. From SAP to SBEM, Thermal Bridging to overheating, we work together to develop unique strategies that will achieve planning consent without hassle.

FUTURA BRIGHT

Who are Futura Bright?

What we offer:

- Energy and Sustainability Statements and Strategies
- Energy Calculations for Part L Compliance (SAP and SBEM) inc. EPC's
- Thermal Comfort and Overheating
- Assessments to TM52, TM59, and BB101 Dynamic Simulation and Thermal Modelling
- Whole Life Carbon Assessments
- Circular Economy Statements
- BREEAM AP
- CFD Analysis
- Reflection Studies and Glare Assessments
- Internal Daylight Modelling
- Thermal Bridge Modelling
- U-Value Calculations
- Condensation Risk Assessments
- Water Calculations for Part G Compliance
- Air quality Neutral Report
- BREEAM Domestic Refurbishment Assessment
- Home Quality Mark Assessment
- Light Pollution Assessments (Dark Skies)
- Daylight, Sunlight and Overshading Analysis



FUTURA BRIGHT

We'll cover...

- Key problems
- Routes to compliance
- Secondary considerations
- Understanding Overheating constraints in Part O Modelling
- Top tips
- Case studies
- Help with compliance

FUTURA BRIGHT

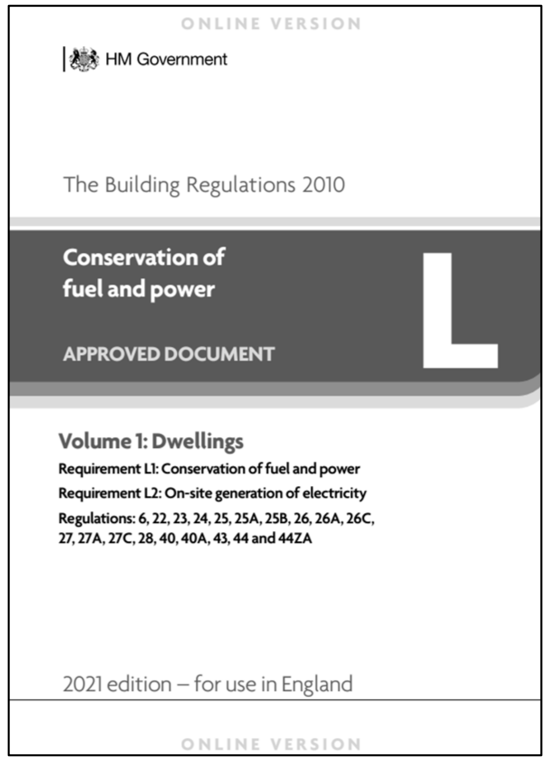
Navigating Approved Document O

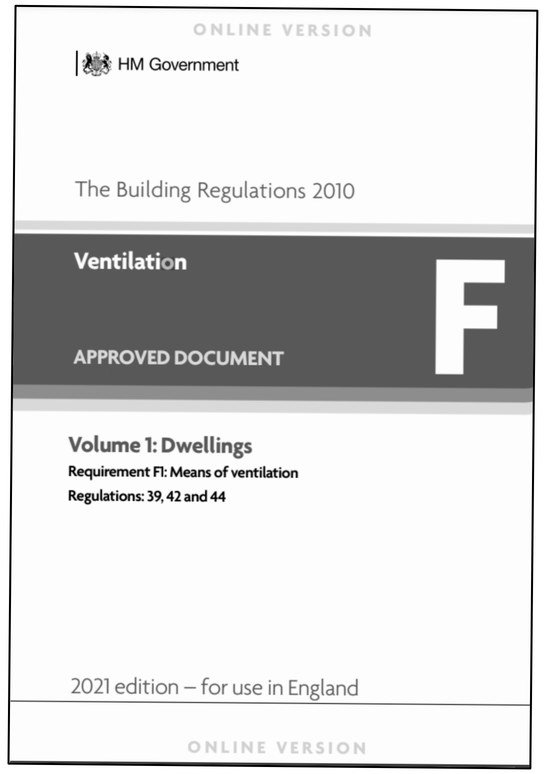
Building Regulations Part O

Introduced in 2022 as part of a wider update of Building Regulations which included:

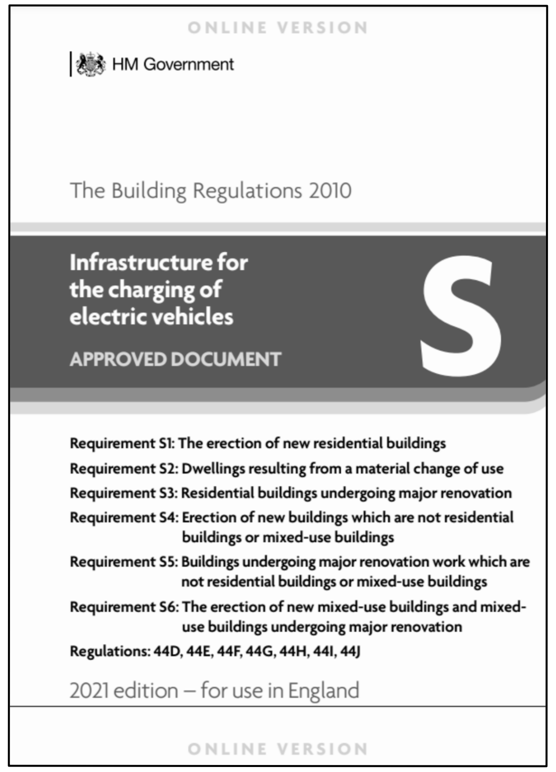
Updates to Parts F (Ventilation) and L (Conservation of Fuel and Power)

Introduction of new regulations in the form of Part O (Overheating) and Part S (Infrastructure for the Charging of Electrical Vehicles)


ONLINE VERSION
HM Government
The Building Regulations 2010
Conservation of fuel and power
APPROVED DOCUMENT
L
Volume 1: Dwellings
Requirement L1: Conservation of fuel and power
Requirement L2: On-site generation of electricity
Regulations: 6, 22, 23, 24, 25, 25A, 25B, 26, 26A, 26C, 27, 27A, 27C, 28, 40, 40A, 43, 44 and 44ZA
2021 edition – for use in England
ONLINE VERSION


ONLINE VERSION
HM Government
The Building Regulations 2010
Ventilation
APPROVED DOCUMENT
F
Volume 1: Dwellings
Requirement F1: Means of ventilation
Regulations: 39, 42 and 44
2021 edition – for use in England
ONLINE VERSION


ONLINE VERSION
HM Government
The Building Regulations 2010
Overheating
APPROVED DOCUMENT
O
Requirement O1: Overheating mitigation
Regulations: 40B
2021 edition – for use in England
ONLINE VERSION


ONLINE VERSION
HM Government
The Building Regulations 2010
Infrastructure for the charging of electric vehicles
APPROVED DOCUMENT
S
Requirement S1: The erection of new residential buildings
Requirement S2: Dwellings resulting from a material change of use
Requirement S3: Residential buildings undergoing major renovation
Requirement S4: Erection of new buildings which are not residential buildings or mixed-use buildings
Requirement S5: Buildings undergoing major renovation work which are not residential buildings or mixed-use buildings
Requirement S6: The erection of new mixed-use buildings and mixed-use buildings undergoing major renovation
Regulations: 44D, 44E, 44F, 44G, 44H, 44I, 44J
2021 edition – for use in England
ONLINE VERSION

FUTURA BRIGHT

Approved Document GOverheating

Timeline:

Effective from **15th June 2022** for projects starting **15th June 2023**.

Scope:

Applies to **England only** and covers all **residential buildings** and institutional premises where people sleep (**excluding hotels**).

Requirements:

Manage overheating risk using either a **Simplified Method** or **Dynamic Thermal Modelling**.

Additional Considerations:

Noise, pollution, security, fall protection, and entrapment prevention.

FUTURA BRIGHT

Primary Objective……

To protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures by:

a. Limiting unwanted solar gains in summer

b. Providing an adequate means of removing excess heat from the indoor environment

Note: this is not a methodology to ensure internal comfort, rather to minimise health impacts from elevated internal temperatures

Influencing Factors

Modern Building Trends:

More insulated, airtight, and densely packed dwellings.

Increased use of communal heating adds internal heat gains.

Rise in single-aspect dwellings limits cross-ventilation.

Regulatory Context:

Insulation requirements have risen, prompting overheating to be addressed.

Historically assessed via SAP (Part L) with basic calculations.

Balance: energy-efficient, airtight homes (Part L) that still have adequate ventilation (Part F) and overheating protection (Part O).

FUTURA BRIGHT

Routes to compliance

TWO ROUTES TO COMPLIANCE ARE OFFERED:

Simplified Method (ADO Section 1)

Dynamic Method (ADO Section 2)

FUTURA BRIGHT

Simple Assessment

Glazing and Ventilation Limits:

- Specifies maximum glazed areas based on cross-ventilation or no cross-ventilation.
- Provides free-opening area limits under similar conditions.

Solar Shading:

- Mandatory for buildings in high-risk locations (e.g., Central London).

Applicability:

- **Not suitable** for buildings with multiple units using communal heating or hot water systems.

Ease of Use:

- **No software** or **experienced** modeller needed.
- Produces **less accurate results** compared to the DSM (Dynamic Simulation Model) method.

FUTURA BRIGHT

Dynamic Assessment

Based on CIBSE TM59 modelling…….

Dynamic thermal modelling method

2.3 To demonstrate compliance using the dynamic thermal modelling method, all of the following guidance should be followed.

a. CIBSE's TM59 methodology for predicting overheating risk.

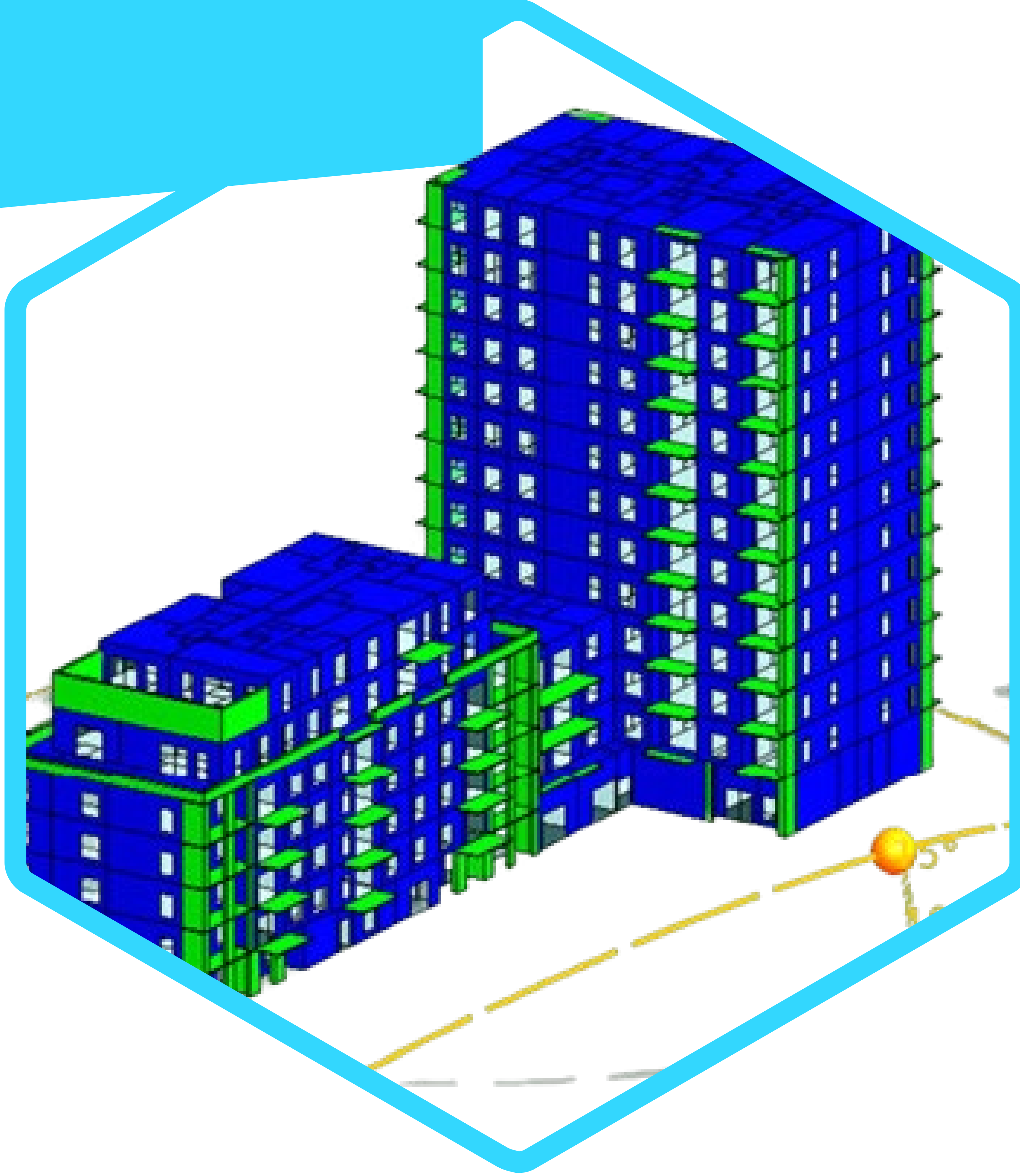
b. The limits on the use of CIBSE's TM59 methodology set out in paragraphs 2.5 and 2.6.

c. The acceptable strategies for reducing overheating risk in paragraphs 2.7 to 2.11.

2.4 The building control body should be provided with a report that demonstrates that the residential building passes CIBSE's TM59 assessment of overheating. This report should contain the details in CIBSE's TM59, section 2.3.

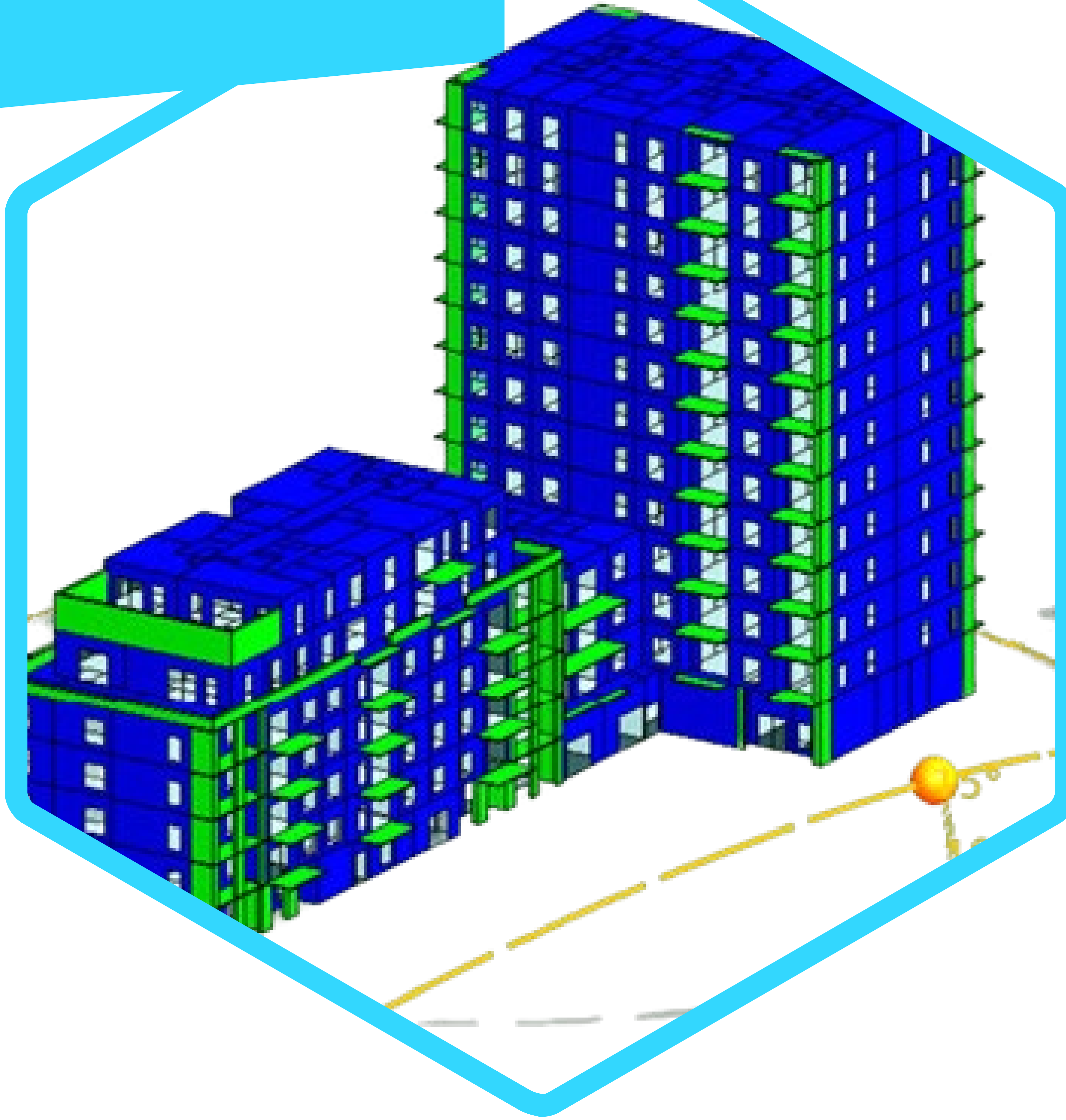
NOTE: Appendix B of this approved document includes a compliance checklist. The designer may use this checklist to demonstrate compliance to the building control body.

……. But with limitations applied



FUTURA BRIGHT

Dynamic Assessment



Dynamic Simulation Model (DSM) allows greater flexibility in design

Based on **CIBSE TM59** thermal comfort standards:

- Utilises data from **16 weather sites** across the UK.
- **Adaptive Comfort Model** for naturally ventilated spaces.
- **Fixed Temperature Model** for mechanically ventilated spaces.

FUTURA BRIGHT

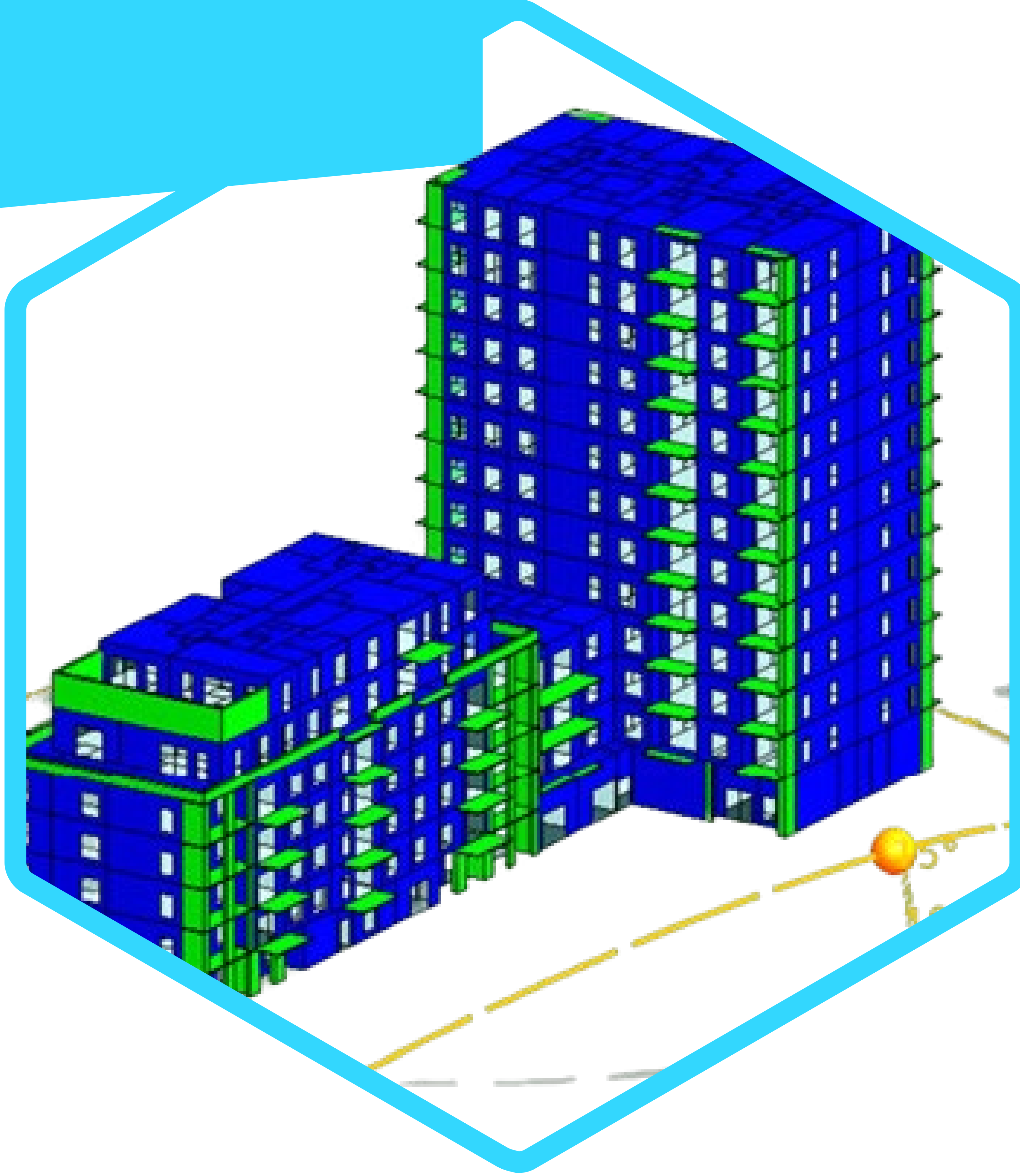
Dynamic Assessment

Overheating Criteria:

- **Naturally Ventilated Spaces**:
  - Living spaces: Overheat if >3% of annual occupied hours exceed threshold temperature.
  - Bedrooms: Overheat if >26°C for 32+ hours (22:00–07:00).
- **Mechanically Ventilated Spaces**:
  - Overheat if >26°C for more than 3% of annual occupied hours.
- **Corridor Assessment:**
  - Overheat if >28°C during operative hours

Part O Guidance:

- Includes modeling parameters for window openings and internal shading.

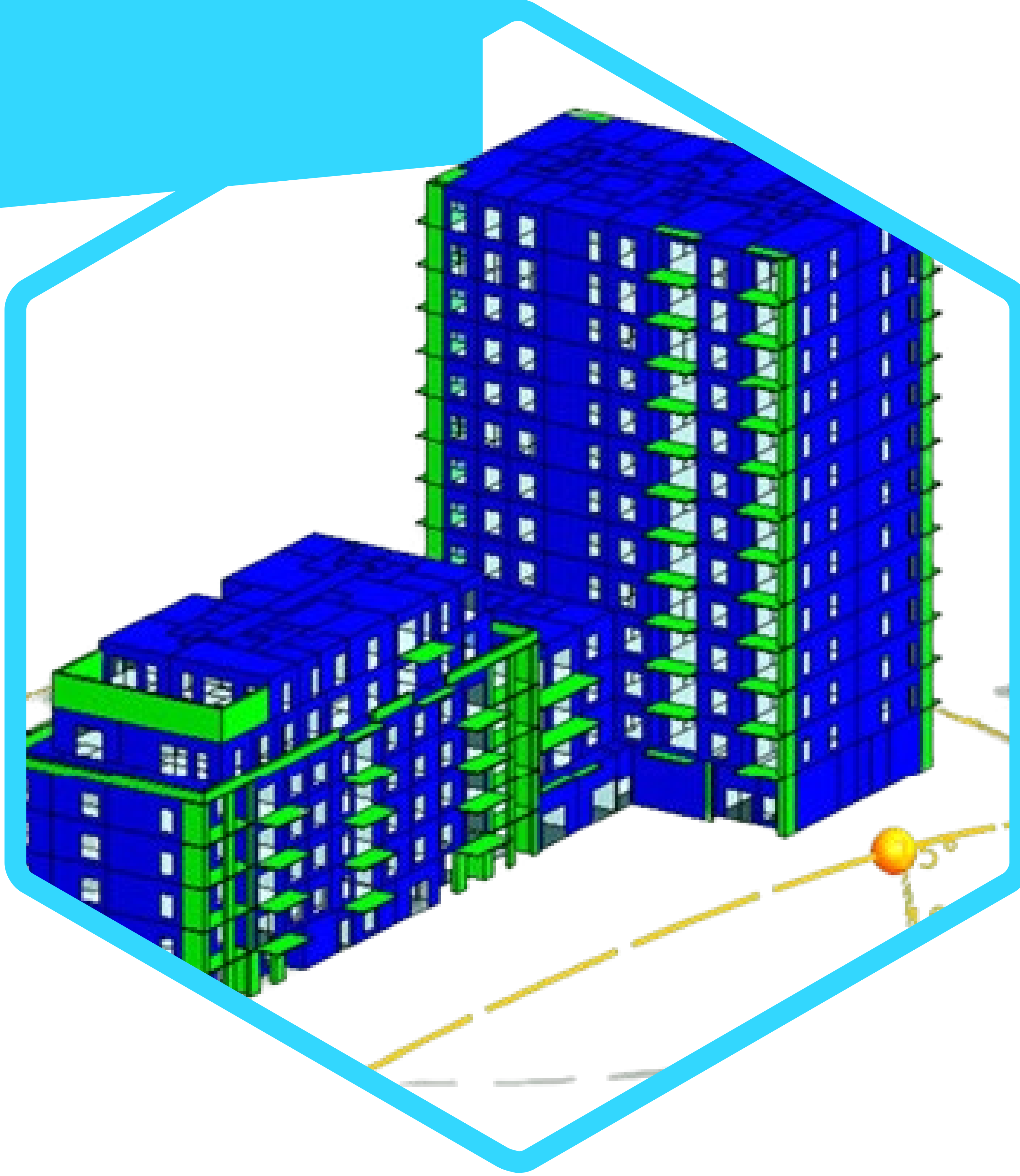


FUTURA BRIGHT

Dynamic Assessment

Compared to TM59, key limitations are applied on Dynamic Modelling for Part O purposes:

- Opening restrictions
- Opening Times – day and night
- Internal Shading
- Adjacent Buildings



FUTURA BRIGHT

FUTURA BRIGHT

Overheating variables and Secondary Considerations

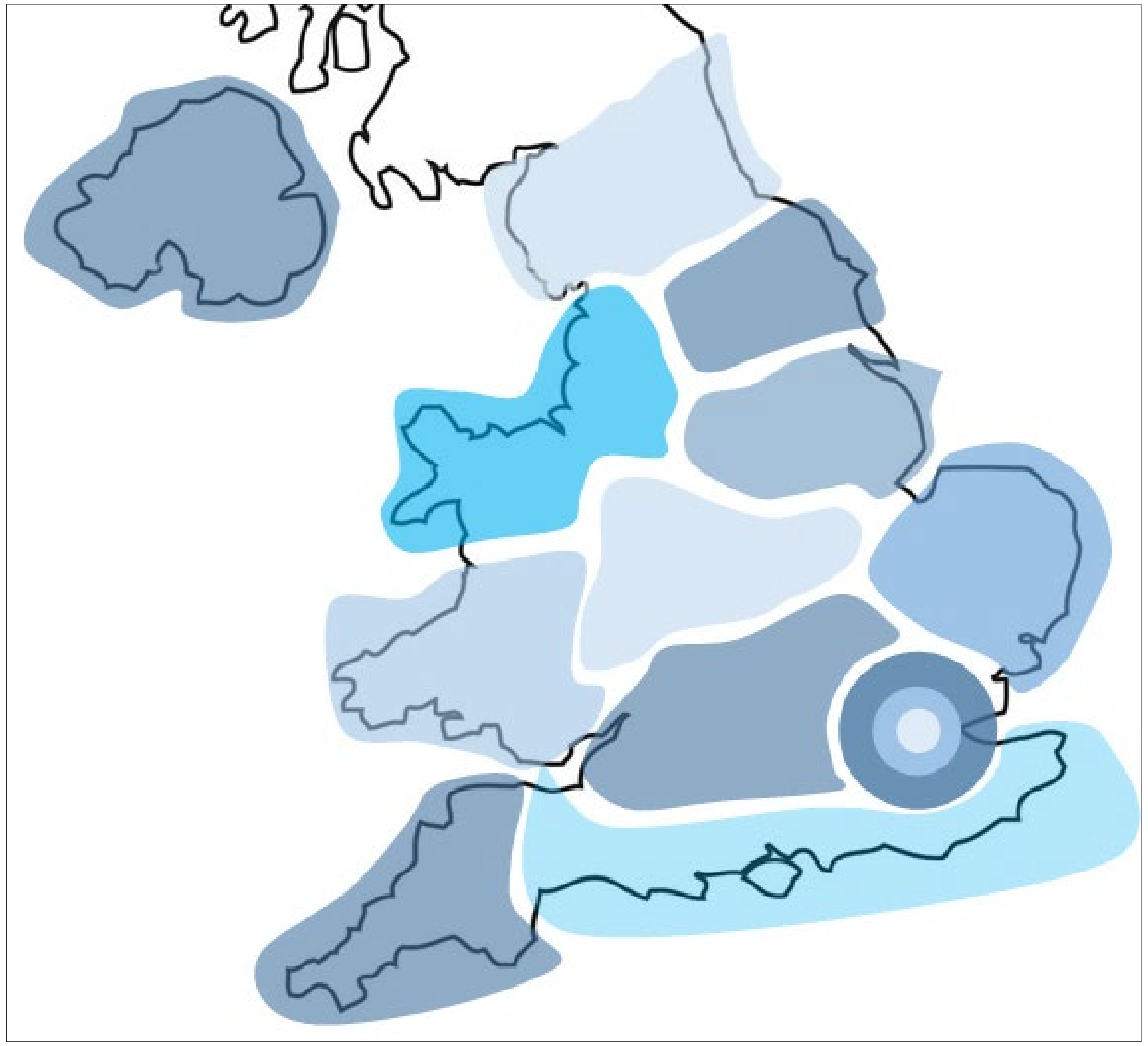
Overheating variables

Window Opening Assumptions

- Occupant Behavior
- Ventilation Rates

External Factors

- Climate Variability
- Weather data



Building Design Elements

- Shading Devices
- Thermal Mass

FUTURA BRIGHT

Secondary considerations

In addition to the considerations required to reduce internal temperatures during the summer, the overheating strategy for any building will also need to consider the following **for openings which form part of the overheating strategy**:

- Intrusion
- Noise
- Protection from falling
- Entrapment
- Pollution

Secondary considerations

INTRUSION

To avoid intrusion, any easily accessible openings cannot form part of your nighttime ventilation strategy.

Part O defines "easily accessible" as the following:

- "A window or doorway, any part of which is within 2m of an accessible level, such as ground or basement level or access boundary"
- "A window within 2m vertically of a flat or sloping roof (with a pitch of less than 30 degrees) that is within 3.5m of ground level"

FUTURA BRIGHT

Secondary considerations

NOISE

Where noise levels are too high, these openings cannot form part of your nighttime ventilation strategy

Part O states the following:

"Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

- 40dB, averaged over 8 hours (between 11pm and 7am)
- 55dB more than 10 times a night (between 11pm and 7am)"

Secondary considerations

PROTECTION FROM FALLING

"Openings that can be opened wider than 100mm may form part of the overheating mitigation strategy where they meet all of the following conditions.

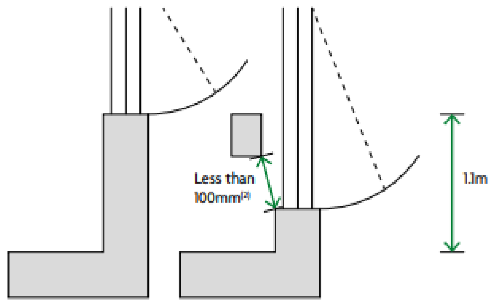
a. Window handles on windows that open outwards are not more than 650mm from the inside face of the wall when the window is at its maximum openable angle.

b. Guarding meets the minimum standards in Table 3.1.

c. Guarding does not allow children to easily climb it. For example, horizontal bars should generally be avoided."

Table 3.1 Guarding heights

Change in floor level between inside and outside	Guarding height[1]
Less than 600mm	See Approved Document K
More than 600mm	1.1m



NOTES:
1. This approved document has increased levels of protection from falling compared to Approved Document K. Where applicable, the higher standard applies.
2. Guarding should be sized to prevent the passage of a 100mm sphere.

FUTURA BRIGHT

Secondary considerations

ENTRAPMENT

Part O states the following:
"Louvered shutters, window railings and ventilation grilles should not allow body parts to become trapped. They should comply with all of the following:

- Not allow the passage of a 100mm diameter sphere.
- Any hole which allows the passage of an 8mm diameter rod should also allow the passage of a 25mm diameter rod (such holes should not taper in a way that allows finger entrapment).
- Any looped cords must be fitted with child safety devices."

FUTURA BRIGHT

Secondary considerations

POLLUTION

Local pollution may limit window use for overheating mitigation, requiring site-specific analysis.

Mechanical ventilation systems must address this with carefully designed filtration and intake locations where needed.

Part F provides further details on ventilation :

Table 2.1 Limit values from Schedule 2 to the Air Quality Standards Regulations 2010

Pollutant	Exposure limit	Exposure time
Carbon monoxide	10mg/m^3	8-hour average
Sulphur dioxide	350µg/m^3	1-hour average
	125µg/m^3	1-day average
Nitrogen dioxide	200µg/m^3	1-hour average
	40µg/m^3	1-year average
Benzene	5µg/m^3	1-year average
Lead	0.5µg/m^3	1-year average
$PM_{2.5}$	25µg/m^3	1-year average
PM_{10}	50µg/m^3	1-day average
	40µg/m^3	1-year average

FUTURA BRIGHT

Tips to Maintain Comfortable Summer Temperatures

When the internal air temperature is above the external air temperature

- Reduce solar heat gains
- Reduce internal heat gains
- Increase heat loss via natural ventilation
- Increase heat loss via mechanical ventilation
- Thermal insulation and air tightness are not desirable

When the internal air temperature is below than the external air temperature

- Reduce solar heat gains
- Reduce internal heat gains
- Reduce conductive heat gains
- Reduce infiltration heat gains
- Reduce heat gains via natural ventilation
- Reduce heat gains via mechanical ventilation (with heat recovery)
- Thermal insulation and air tightness are desirable

FUTURA BRIGHT

Modelling Procedure

THE IMPLIMENTATION OF MITIGATION STRATEGIES

In early-stage design, consider optimal orientation, balanced window placement, external shading, and high-performance thermal mass and insulation

Mitigation strategies follow an overheating hierarchy: passive designs (low-G glazing, shading, ventilation), then natural/mechanical ventilation, and finally mechanical cooling.

- Optimised orientation and window placement
- Enhanced glazing (Low G-value)
- Shading devices
- High-performance insulation
- High thermal mass materials
- Natural ventilation strategies:
- Cross-ventilation design
- Night purge ventilation
- Stack ventilation Trickle ventilators
- Mechanical ventilation and cooling
- Ceiling fans Mechanical ventilation (MVHR)
- Mechanical ventilation with cooling element
- Active cooling solutions

FUTURA BRIGHT

Why use a Dynamic Assessment?

SIMPLE ASSESSMENT

Detached 4 bedroom house, London - 180m2

Living – 15.5m2
Kitchen/Dining – 27.5m2
Bedroom 1 – 14m2
Bedroom 2 - 12m2
Bedroom 3 – 6m2
Bedroom 4 -8m2

FUTURA BRIGHT

Why use a Dynamic Assessment?

SIMPLE ASSESSMENT

Detached 4 bedroom house, London - 180m2

Building Regulations Part O 2021 (England), Simplified Method - Results

Is dwelling in a location where external noise may be an issue?	**No**
Is dwelling located near to significant local pollution sources?	**No**
Direction of house type plan 'clock face 6' on site wide plan	**North**

Future Homes Hub spreadsheet tool version: FHH-SM-BETA-1

A	**Site data**	
	Company	FB
	Site	Richmond
	House type	Barnwood
	Plot number	Plot 3
B	**Home data**	
	Location risk category	**High Risk**
	Shading provided?	**Provided**
	Cross ventilation?	**Yes**
	Total GIA of home (m^2)	**180**
	Largest glazed façade orientation	**South**

C **Results**	**Value**		**Percentage**		**Target**		**Result**	✓×
Limiting solar gains:								
Total glazing area for home	28.30	m^2	15.72	%	15	%	< target	×
Glazing area for most glazed room: **Living**	8.51	m^2	54.77	%	22	%	< target	×
Shading	Provided				Required			✓
Removal of excess heat:								
Total equivalent area (% of floor area)	24.16	m^2	13.42	%	6	%	> target	✓
Total equivalent area (% of glazed area)	24.16	m^2	85.37	%	70	%	> target	✓
Bedroom 1 equivalent area	1.01	m^2	7.26	%	13	%	> target	×
Bedroom 2 equivalent area	1.01	m^2	8.65	%	13	%	> target	×
Bedroom 3 equivalent area	0.84	m^2	13.25	%	13	%	> target	✓
Bedroom 4 equivalent area	0.84	m^2	10.12	%	13	%	> target	×
Bedroom 5 equivalent area		m^2		%		%		

FAIL

Maximum area of glazing (% floor area) in the most glazed room exceeds the requirements

Bedrooms 1,2 and 4 do not meet the required glazed standards of Table 1.1 of ADO

……A DSM Assessment is then needed

FUTURA BRIGHT

Why use a Dynamic Assessment?

DYNAMIC THERMAL MODELLING

Detached 4 bedroom house, London -

Compliance Forms

IES INTEGRATED ENVIRONMENTAL SOLUTIONS

Test Plot 3 Page 1 of 5

Building details

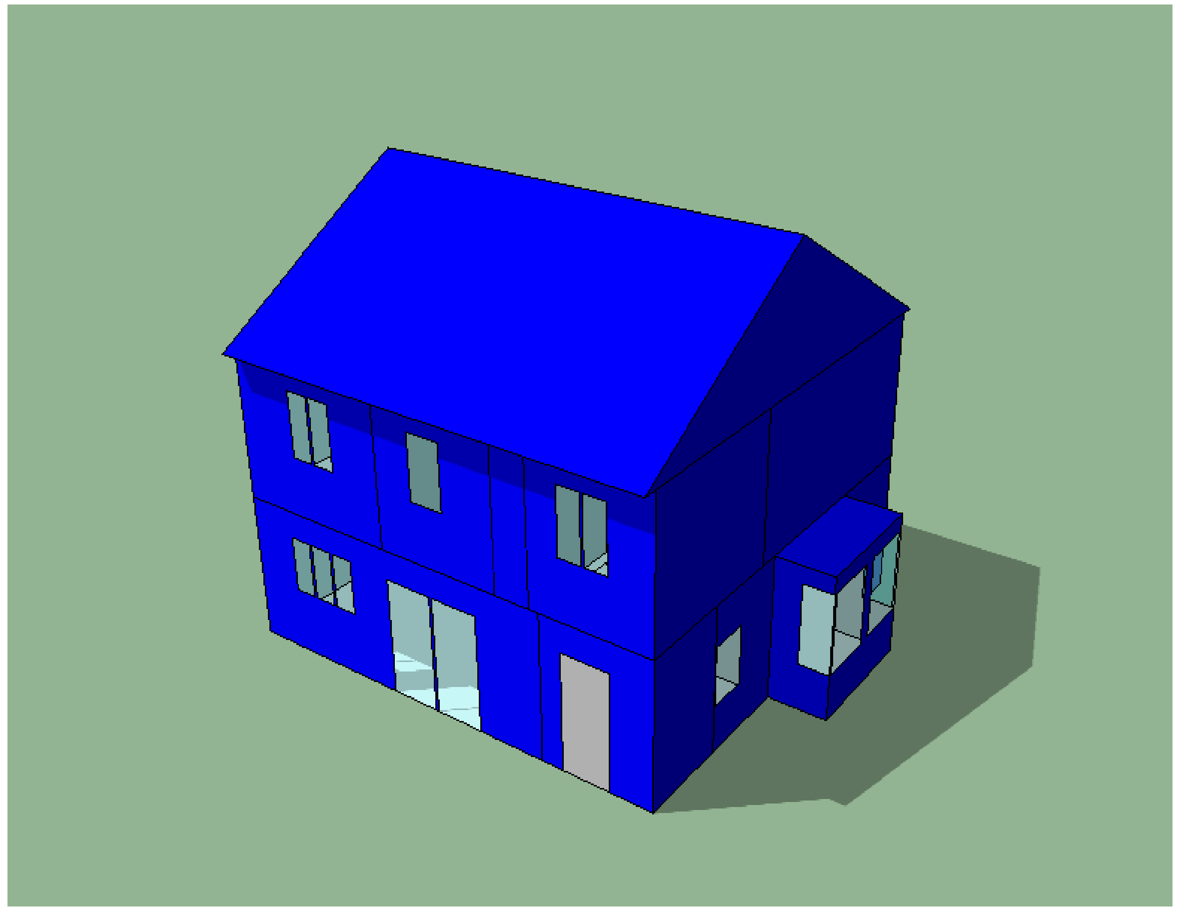
Project name: Test Plot 3	Date: 27-11-2024 12:20:43
Location: London Heathrow, United Kingdom	
Address: Richmond	
Building use: 1 off house	
Are there any security, noise, or pollution issues: N/A	

Designer's details

Designer's name:
Designer's organisation: FB
Designer's address:

Dynamic thermal model

Software: IESVE version 2024.0.0.0	
Weather file: London_LWC_DSY1_2020High50.epw	
Results file: Test plot.aps	
Number of rooms analysed: 7	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy: Low G values to Living space, additional ventilation to bedrooms 1,2 and 4	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	YES
Designer's signature:	



Mitigations to pass ADO

- Low G value to the Living glazing
- Additional ventilation to the bedrooms

Key takeaways

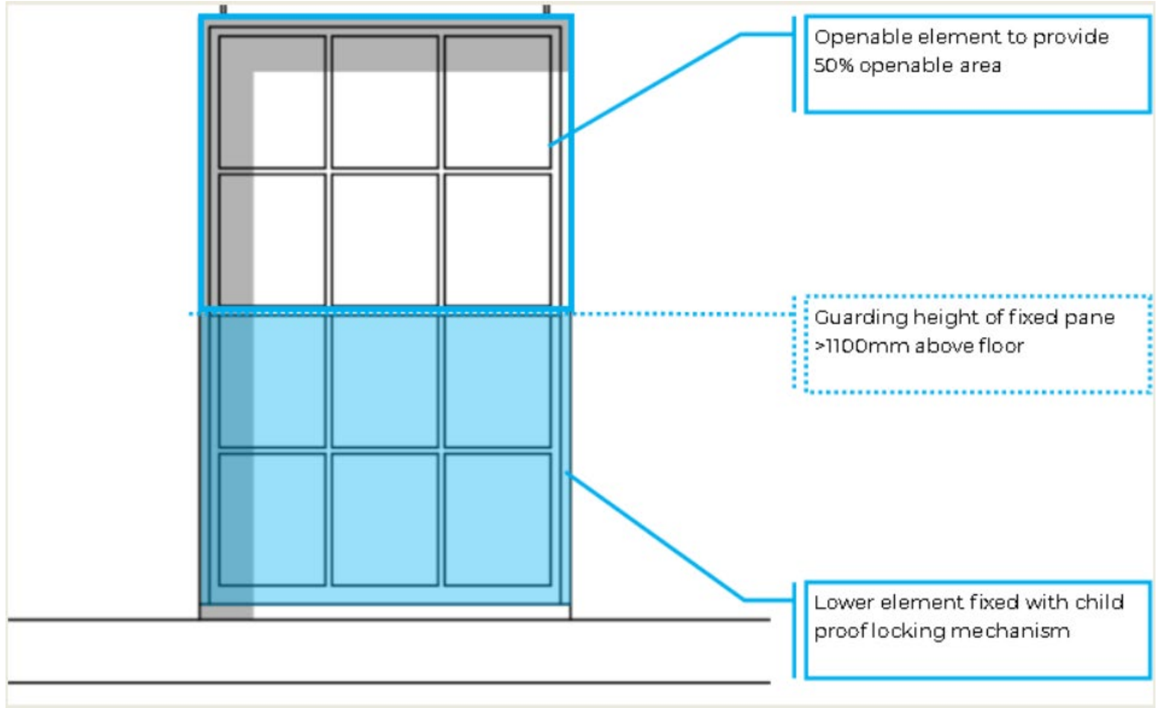
- The simplified method does not tell **why it fails** – under ventilated? over glazed? etc.
- DSM allows for **mitigations**
- The Simplified method is not **SIMPLE!**

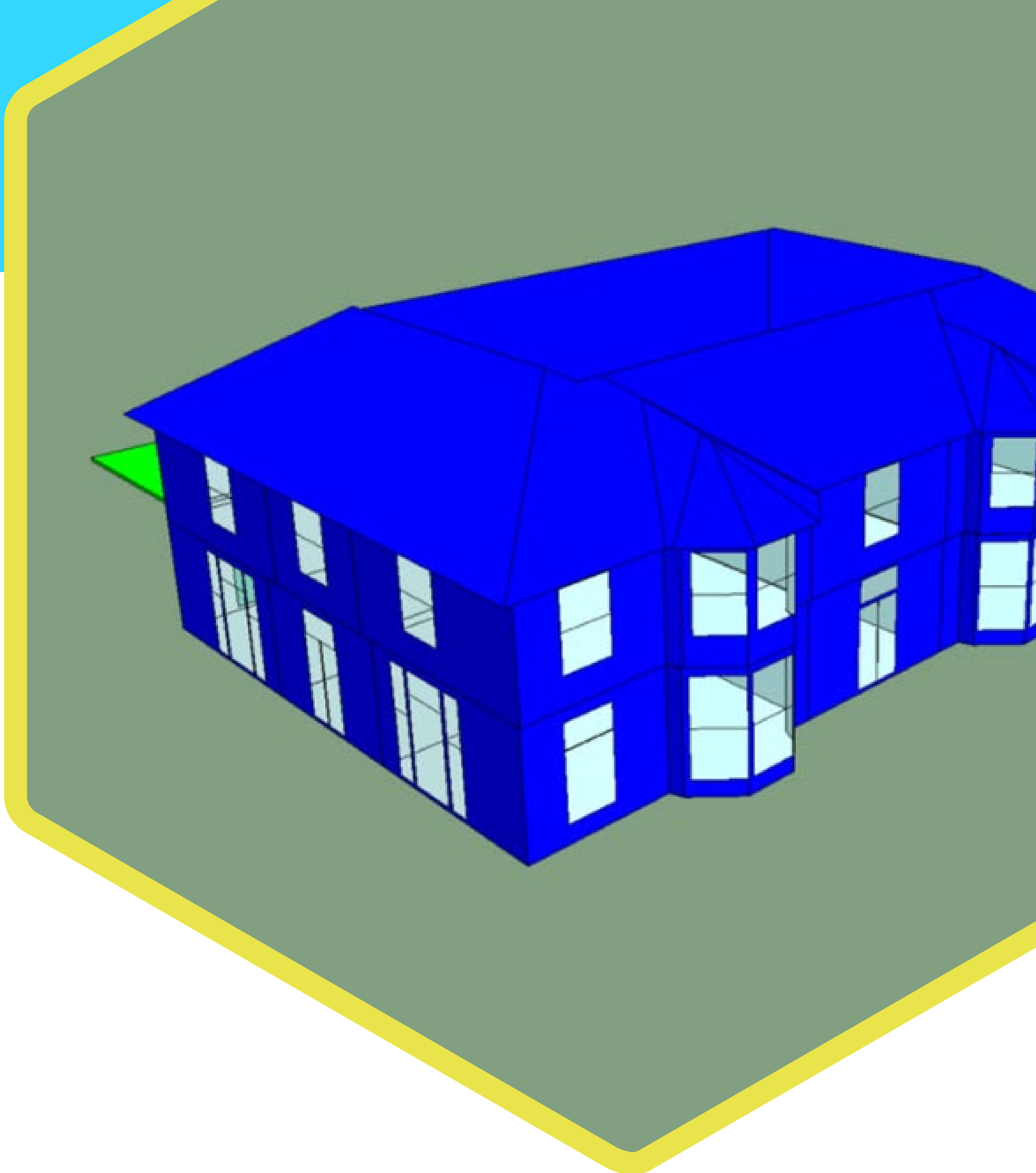
FUTURA BRIGHT

Part O- Case study

Large Detached Property

- Windows below 1100mm sill height required guarding measures to meet Part O safety standards.
- Proposed lockable child-safe mechanism for lower section of sash windows, allowing the upper section to open above 1100mm.
- Dynamic modelling confirmed all rooms met Part O criteria without additional mitigation measures.





FUTURA BRIGHT

Part O- Case Study

Mass Residential Development

This development comprises of two new apartment blocks ranging from four to thirteen storeys.

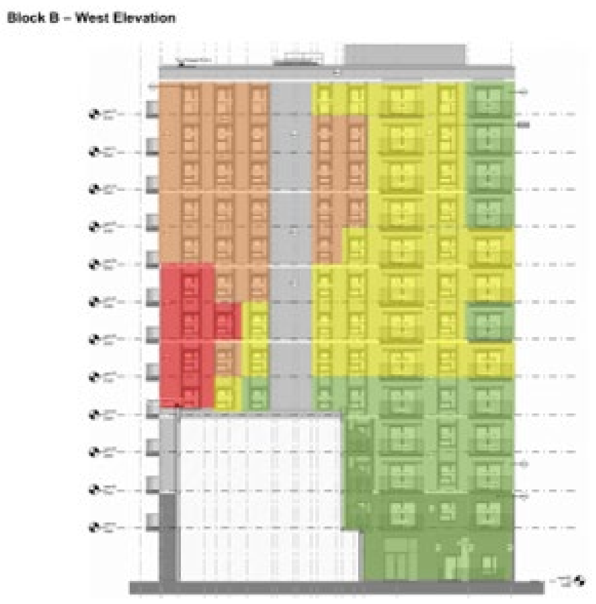
ISSUES:

- Acousticians identified high road traffic noise on several facades.
- Security issues on ground floor bedrooms.
- Tested passive and mechanical solutions for units failing due to restricted or closed windows.

SOLUTIONS:

- Reduced solar gains
- Increased air change rates
- Implemented a cooling element to MVHR

Modelling of every dwelling, incorporating acoustic data and restrictions, allowed mechanical ventilation and cooling solutions to be applied only where needed – saving costs on MEP installations!



FUTURA BRIGHT

Summary

- Part O is designed to safeguard health and safety, not ensure comfort
- Simplified method suitable only for standard house types with little variation but is limited on the mitigation methods allowed to comply.
- Dynamic method allows a design focused approach to compliance
- It is recommended to confirm compliance with Part O prior to planning approval so that changes to glazing can be incorporated. This model should then be kept up-to-date as the design evolves.
- Secondary considerations on the modelling can be constraining, with noise being the most common issue faced to date due to low level of noise thresholds
- Modelling of every unit can provide significant cost savings in areas where noise impacts vary, so that plant can be specified only where required.

FUTURA BRIGHT

Q&A

FUTURA BRIGHT
SHAPING A SUSTAINABLE FUTURE

FUTURA BRIGHT

SHAPING A SUSTAINABLE FUTURE

01489 346705

ask@futurabright.co.uk

FuturaBright.co.uk

Futura Bright Limited
1600 Parkway
Solent Business Park
Whiteley, Fareham
PO15 7AH
United Kingdom