Energy and Sustainability Statement

Site

Flat 3, 30 Fitzjohn's Avenue London NW3 5NB

Proposal

Refurbishments and Overheating Risk Assessment of Flat 3

1st March 2024

Ref. AJ-1380

Table of Contents

Report Completed By	SAPS
Reviewed By	Giovanni Maurizi
Signature	Giovanni Maurizi

1) Executive Summary

a) This Energy Strategy has been produced by Asaps.co.uk on behalf of the Applicant.

b) It will set out the design measures that have been implemented by the Applicant to achieve the required CO2 reductions as well as Overheating risk assessment at the development site: Flat 3, 30 Fitzjohn's Avenue London NW3 5NB.

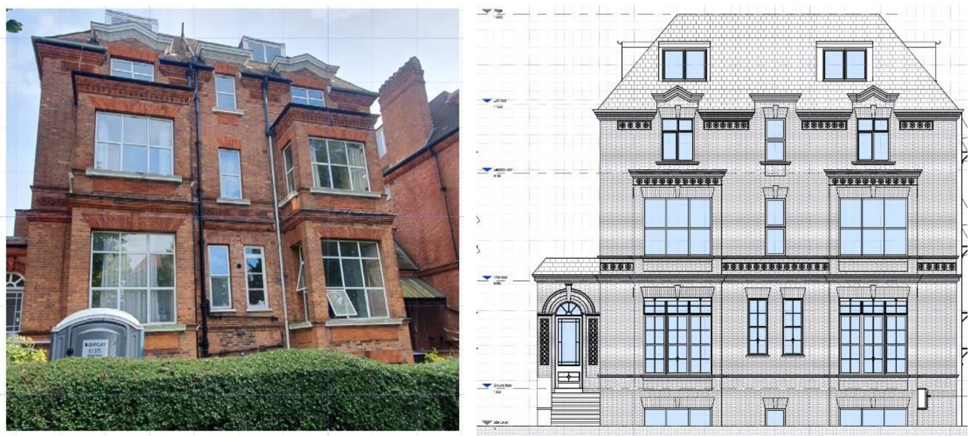

Figure 1 View and Elevation of proposed Dwelling.

c) This Strategy is written in support of the full planning application being submitted to the Camden Planning Council.

d) The Strategy will demonstrate measures taken by the Applicant to comply with:

i) National Planning Policy Framework.

ii) The London Plan (Greater London Authority, 2023) planning policies on climate change mitigation measures to:

iii) Development proposals should make the fullest contribution to minimizing carbon dioxide emissions by the following energy hierarchy:

(1) Be lean: use less energy.

(2) Be clean: supply energy efficiently.

(3) Be green: use renewable energy.

iv) Energy Planning, Greater London Authority, and Camden Planning guidance on preparing energy assessments.

e) The Energy Strategy describes demand-reduction measures, energy-efficiency measures renewable energy about how the Applicant meets the objectives of the energy hierarchy: Be Lean, Be Clean, Be Green. Refer to Figure 1.

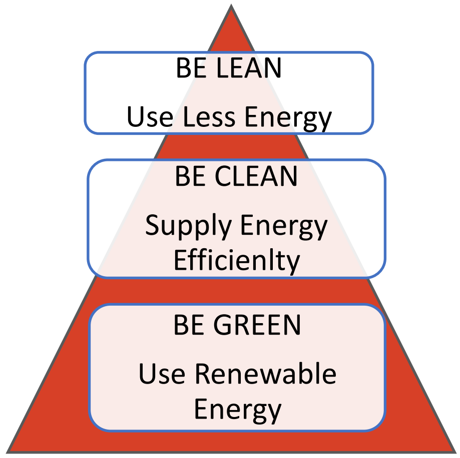

Figure 2 The Energy Hierarchy

f) The Strategy concludes that the following combination of measures, summarized here in Table 1, are included in the design of the Development:

Table 1 Measures incorporated to deliver the energy standard.

BE LEAN	• Energy-efficient building fabric and insulation to all heat-loss floors, walls, and roofs. • High-efficiency double-glazed windows on the front façade. • Efficient building services including high-efficiency heating systems. • Low-energy lighting throughout the building. • Dynamic Thermal Modelling to mitigate overheating Risk.
BE CLEAN	• No Reduction through Be Clean.
BE GREEN	• No Reduction through Be Green.

The impact of these design measures and low-carbon and renewable energy solutions, in terms of how the Applicant delivers their commitment to the energy hierarchy, is illustrated in Figure 2. The CO2 emissions at each stage of the energy hierarchy and percentage savings are set out in Table 2.

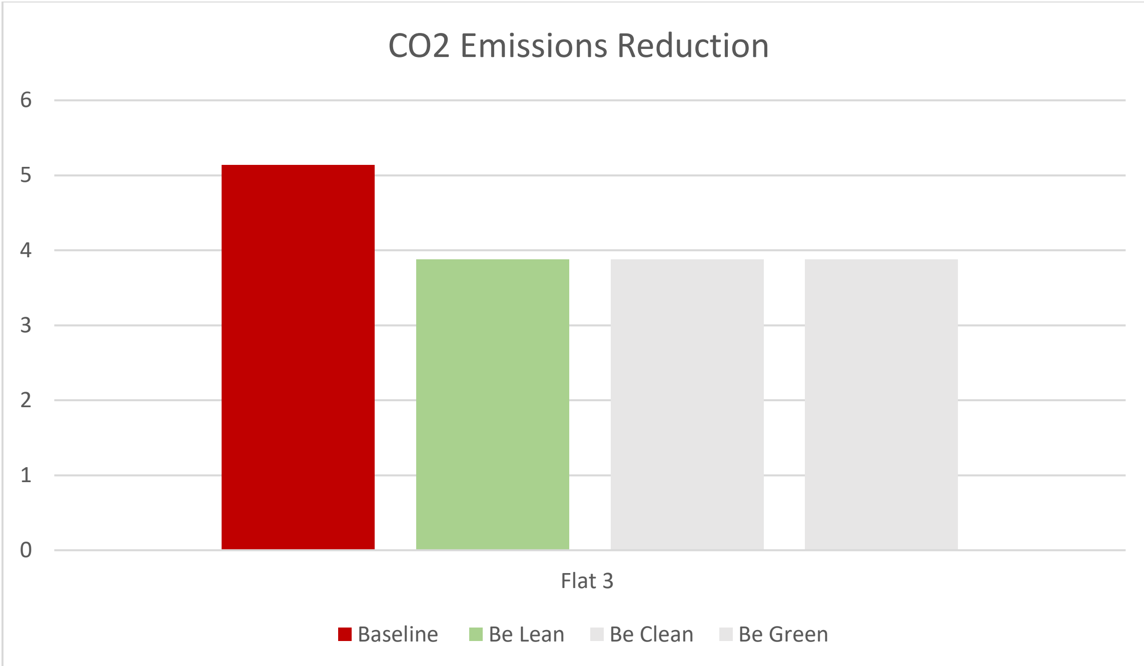

Figure 3 How the Development delivers the energy hierarchy.

Table 2 CO2 emissions and savings after each stage of the energy hierarchy

Total Emissions	Existing Baseline C02 Emissions (tonnes of CO2/ Yr.)	Be Lean C02 Emissions (tonnes of CO2/ Yr.)	Be Clean C02 Emissions (Tonnes of CO2/ Yr.)	Be Green C02 Emissions (Tonnes of CO2/ Yr.)	% Reduction
	5.14	3.88	N/A	N/A	24.31 %

2) Introduction

a) ASAPS has been instructed by the client to prepare an Energy and Sustainability statement or a Carbon Reduction Statement to support the planning application for the dwelling refurbishment, and addition of an active cooling system to the property at 30 Fitzjohn's Avenue London NW3 5NB.

b) This report must be read in conjunction with the application forms, certificates, detailed plans, and other supporting documents submitted to the Local Authority as part of the application.

c) The purpose of this Statement is to outline the possible measures that can be incorporated into the development to make an appraisal of the carbon dioxide emissions of the proposed development, assess the potential fabric and building services efficiencies to reduce the carbon dioxide emission and to suggest the most appropriate means by which the development can contribute towards the aspiration of policy relating to reducing carbon dioxide emissions and energy consumption.

d) The Assessment shall be conducted following the principles set out in the "Energy Hierarchy." These principles can be summarised as follows:
   - Be Lean - use less energy.
   - Be Clean - supply energy efficiently.
   - Be Green - use renewable energy.

e) To demonstrate the carbon dioxide emissions, it is proposed to use the SAP 10 Software by Elmhurst for the calculations to obtain initial baseline carbon dioxide emissions figures for the property.

f) Further calculations will be used to demonstrate the potential carbon dioxide emission savings from the initial calculations by enhancements to the building fabric, plant, and controls - BE LEAN. The carbon dioxide emission saving by the use of renewable energy shall be assessed through the outputs from the SAP calculations - BE GREEN. The suitability of supplying energy, both heat and power, through the use of a combined heat and power system shall be assessed - BE CLEAN.

g) Camden Planning Council, which requires all developments to ensure compliance with the applicable energy and sustainability standards stipulated in the National Planning Policy Framework, and GLA (Greater London Authority) Guidance.

h) The Great London Authority, through the London Plan, 2023, will require developments to contribute towards London's ambitious target to become zero-carbon by 2050 by increasing energy efficiency, including using smart technologies and utilizing low-carbon energy sources.
i) Paragraph 3 of Camden Planning Guidance: “Making Buildings More Energy Efficient” sets a minimum on-site reduction of at least 10 percent beyond Building Regulations for all residential developments and non-residential development should achieve 15 percent through energy efficiency measures.
j) How the Applicant meets the energy standard and CO2 reduction target 30 Fitzjohn's Avenue London NW3 5NB, will be explained in this Strategy as follows:
    i) The Baseline: The Development’s baseline energy demand, the Target Emission Rate (TER): This will be calculated to establish the minimum on-site standard for compliance with Approved Document Part L1B.
    ii) Be Lean: The Development’s building Emission Rate (BER) will be calculated to explain how the Applicant’s design specification has led to a reduced energy demand and improved fabric-energy efficiency. The better the design of the building fabric in terms of, for example, insulation, air tightness, and orientation to maximize solar gain, the less energy is required to heat the building and so the better the fabric's energy efficiency.
    iii) Be Clean: The potential to provide energy to the development in an efficient way, by either connecting to a District Heat Network (DHN) or installing on-site Combined Heat and Power (CHP), will be assessed and viability concluded.
    iv) Be Green: Low-carbon and renewable energy technologies will be assessed for their suitability and viability for the Development. Solutions will be put forward for the development and the resulting CO2 emission savings presented.
k) The Energy and Carbon Reduction Statement follows the principles set out in the Energy Hierarchy and is broken down to provide the following details:
    i) Estimated site-wide regulated carbon dioxide emissions and reductions (broken down for the domestic and non-domestic elements), expressed in tonnes per annum, after each stage of the energy hierarchy.
    ii) A clear commitment to regulated carbon dioxide emissions savings compared to Part L 2022 of the Building Regulations compliant development through energy demand reduction measures alone.

iii) Proof of clear evidence that the risk of overheating has been mitigated through passive and active design measures.
iv) Evidence of investigation into existing or planned district heating networks that the development could be connected to, including relevant correspondence with local heat network operators.
v) Commitment to a site heat network served by a single energy center linking all apartments and non-domestic building uses, if appropriate for the development.
vi) Where applicable, investigations of the feasibility of installing CHP in the proposed development (if the connection can't be made to an area-wide network) before considering renewables.
vii) An initial feasibility test for renewable energy technologies and, where appropriate, commitment to further reduce carbon dioxide emissions through the use of onsite renewable energy generation.

l) Developments are expected to achieve carbon reductions beyond Approved Document L from energy efficiency measures alone to reduce energy demand as far as possible.
m) This is a refurbishment project and therefore the carbon reductions beyond Approved Document L will be limited due to the reuse of the existing structure.
n) Policy SI 4 - Managing Heat Risk, requires developments to minimise adverse impacts of the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure. Developments should demonstrate the potential for internal overheating and reliance on air conditioning systems can be minimised by the following cooling hierarchy:
   i) Reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation, and the provision of green infrastructure.
   ii) minimize internal heat generation through energy-efficient design.
   iii) manage the heat within the building through exposed internal thermal mass and high ceilings.
   iv) provide passive ventilation.
   v) provide mechanical ventilation.
   vi) provide active cooling systems.

3) Energy Assessment

ASAPS has used SAP 10 methodology to calculate energy demand for the proposed building.

a) Baseline Energy Demand

i) To measure the effectiveness of demand-reduction measures, it is first necessary to calculate the baseline energy demand, and this has been done using SAP methodology. This can also be referred to as the Target Emission Rate (TER.)

ii) The resulting AD L 2022, TER for the said property has been calculated using Approved Documents Part L1B, model designs which have been applied to the Applicant's Development details. The TER, or baseline energy demand, represents the maximum CO2 emissions that are permitted for the development to comply with AD L 2022. For the building in context, as it is an existing refurbishment project, the C02 Emissions are calculated using SAP assessment with one assessment with existing specifications and the other with refurbished specifications is calculated (Reports Attached).

b) The Development Baseline

i) The resulting total maximum CO2 emissions permitted for the Development has been calculated as Shown in the Table Below.

Table 3 Baseline Emission Rate

Property	Baseline Emissions (Tonnes CO_2/yr.)
Flat 3	5.14

c) Be Lean – Reduced Energy Demand

i) The development at the proposed site, achieves a high quality, sustainable design by integrating the following design measures to reduce energy demand:

- High-efficiency double-glazed windows throughout the Front Facade.
- Efficient building services including high-efficiency heating systems.

- Low-energy lighting throughout the building.

d) Reduced Energy Demand

i) The Applicant's design specification and intended demand-reduction measures for the Development have been modeled using the same SAP 10 methodology as before. This allows us to assess the effectiveness of Be Lean measures as a percentage reduction in CO2 emissions over the Baseline.

ii) The total calculated CO2 emissions for the proposed building is **3.88 Tonnes of CO2 per annum, which is a reduction of 24.50 %** over the Baseline, refer to Appendix for SAP Results and Table 5 for the Be Lean design specification.

Table 4 Be lean Emission Rate

Property	Be Lean Emissions (Tonnes CO_2/yr.)
Flat 3	**3.89**

Table 5 Be Lean design specification for 30 Fitzjohn's Avenue London NW3 5NB

Elements **U Value (W/m2.K)**	**Existing Dwelling Specifications**	**Be Lean Specifications**
External Walls	1.83	1.83
Roofs	Party Roof	Party Roof
Ground Floor	Party Floor	Party Floor
Glazing	4.8	**1.4**
Doors	N/A	N/A
Space Heating & Efficiency	SAP Default Gas Combi Boiler, 70% Efficiency	**Vaillant Ecofit Pure Combi Boiler, 89% Efficiency**
Cooling System	N/A	**Mitsubishi Air Conditioner, COP-4.77**
Renewables	N/A	N/A

e) Be Clean – Supply Energy Efficiently

i) Steps have been taken by the Applicant to reduce the energy demand of the Development as far as is feasible.
ii) The next step in the energy hierarchy is to consider how the remaining energy demand can be met and whether there is the potential for this to be done through the mechanism of establishing and/or linking up with existing or planned decentralized energy systems.
iii) To ensure compliance with the Greater London Authority's energy hierarchy, the potential to supply energy efficiently to the Development at Flat 3, 30 Fitzjohn's Avenue London NW3 5NB, and further reduce regulated CO2 emissions through Be Clean measures, is evaluated.

i) District Heating System

(1) District Heat Networks (DHN), also referred to as either district energy systems or district heating schemes, produce steam, hot water, or chilled water at a central energy center. Steam or water is distributed in pre-insulated pipework, to individual buildings for space heating, domestic hot water, and air conditioning. As a result, individual buildings served by a DHN do not require its boilers or chillers.

(2) The London Heat Map is an online tool that can help identify opportunities for the use of decentralised energy networks and systems for use in projects. Using the Heat Map, there appear to be no district heating systems available or even proposed in the area, so it would not be feasible to install a plant for future connection to such a network at this time.

ii) Combine Heat And Power

(1) Combined Heat and Power (CHP)

It is a relatively simple technology comprising of an engine (usually gas fired, but can be oil or biomass fired) which fires a generator producing on-site electricity. This process also generates heat as a by-product which can then be used to provide space heating and hot water. CHP systems can be small scale, used in single buildings, or large scale and used in a community or district heating network. As electricity is produced on site, distribution losses in comparison to the national grid are minimal and the heat by-product is captured instead of being wasted. As a result, CHP provides an efficient, low carbon electricity and heat generation solution.

The following extracts from the GLA guidance on preparing energy assessments (March 2022) detail situations where CHP is unlikely to be a viable solution:

- Small-medium residential development - At this scale it is generally not economic to install CHP in residential led, mixed use developments (and where CHP is installed it tends to have lower electrical efficiencies).
- Non-domestic developments with a simultaneous demand for heat and power for less than 5,000 homes per annum. examples of such developments may include offices and schools.

(2) Installation Consideration

- The sizing of a CHP system is critical to its efficiency and operation. An oversized system will require a large buffer tank to absorb excess heat and will often have to turn off. This is not good for long-term operation.
- Systems should therefore be undersized and meet base heating demand (usually hot water demand) to ensure continuous operation.
- Large-scale CHP systems will require sufficient plant room to accommodate the engine and buffer vessel.
- Large systems suitable for developments of 500 or more units, although can be viable on smaller schemes.
- Systems perform well where there is a consistent demand for heat.
- The export of electricity can sometimes require an upgrade to a local substation.
- Flue design is important.
- Design needs to be bespoke to the needs of the development.

(3) Approximate upfront costs (TBC by supplier)

- Costs vary dependant on the size of the system. Small 24 kWt/1 kWe systems may start at £15,000 with larger systems costing substantially more.

(4) Advantages

- There are significant CO_2 reductions for large-scale development (multiple apartment blocks) where there is a consistent requirement for heat.

(5) Disadvantages

- Not financially viable on smaller developments.
- Plant room space required.
- Will not perform well where there is inconsistent demand for heat.
- Up-front and ongoing costs are higher than commercial gas boilers

(6) Conclusion

- As the provision of onsite CHP is not considered viable for the Development, and as district heating networks are not currently available in this area, the Applicant should consider alternative options for providing heating in the building.
- This will be covered in the following Be Green section.
- There is no reduction to be shown via the Be Clean method.

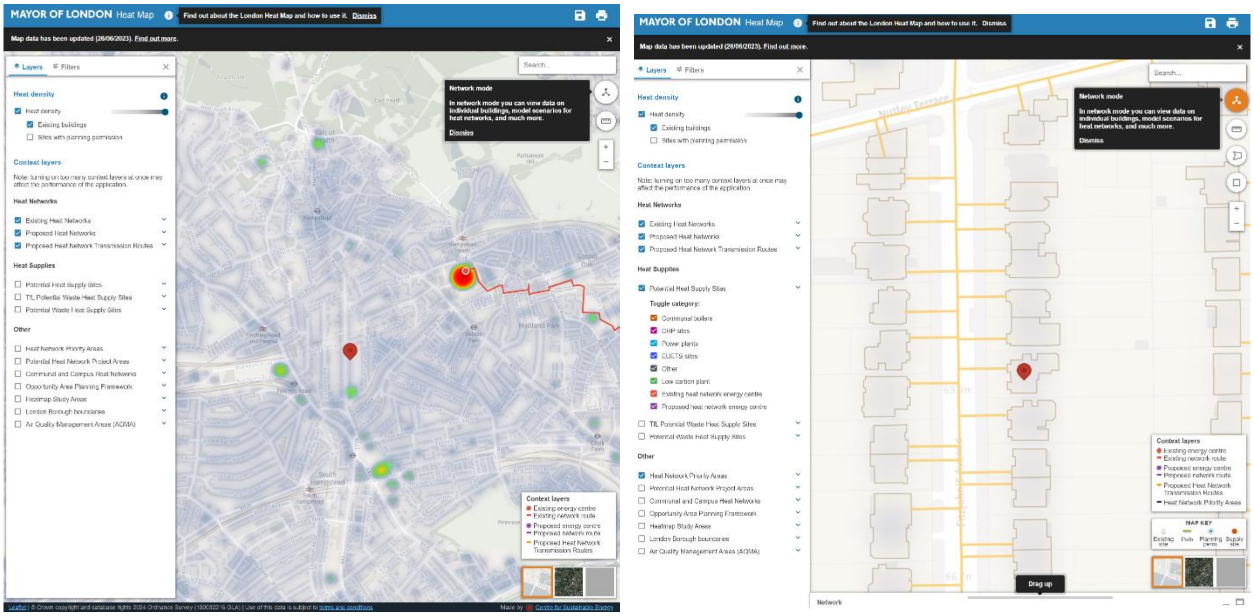

Figure 4 No District Heating or CHP Network in the vicinity.

f) Be Green – Low-Carbon and Renewable Energy

i) The next step in the Energy Hierarchy is to reduce carbon dioxide emissions by the use of renewable technologies - **BE GREEN**.

(1) Solar Photovoltaics

(a) Roof-mounted PV panels should ideally face southeast to southwest at an elevation of about 10°. However, in the UK even if installed flat on a roof, they receive 90% of the energy of an optimum system.

(b) No PV Panels are Installed or proposed in the future as per the client.

(2) Domestic Solar Hot Water System

(a) Approximately 2-4m2 of solar thermal collectors could provide the hot water requirements of a typical building. These could be used to feed twin coil hot water cylinders positioned within the building, allowing the water to be heated by the sun when possible whilst retaining the backup of the main heating system when required.

(b) Although often not unattractive, and possible to integrate into the building or roof cladding system domestic solar thermal collectors are still considered likely to have visual implications, therefore careful sighting of the panels is required.

(c) Since Hot water demand is served through a combi boiler, therefore no Hot water system is proposed as per the client.

Table 6 Building Emission Reductions

Strategy	Total Building CO2 Emissions combined for Units in Tonnes of CO2/year	Percentage Reduction from Baseline
Baseline	**5.14**	**---**
Be Lean	**3.89**	**24.31%**
Be Clean	**N/A**	**---**
Be Green	**N/A**	**---**

5) Annual Carbon Dioxide Emission Reduction

a) Based on the initial SAP 10 calculations for the building, it has been calculated that the baseline carbon dioxide emissions figure is **5.14 Tonnes of C02/year.**

a) In accordance with the Planning Policies set out by the Local Planning Authority and the London Plan, this report has demonstrated a carbon dioxide emissions improvement of **24.31 %** by fabric and energy efficiencies.

b) In addition, a further reduction in carbon dioxide emissions is possible by the use of renewable technologies in the form of solar photovoltaic panels. But no PV Panels are installed as per client.

c) For the purpose of planning and based on the figures provided by SAP10 calculations, this report has demonstrated that it is feasible, with the improvement of the building fabric, energy-efficient heating and controls systems, that carbon dioxide emissions reduction in excess of **24.31 %,** could be achieved. This complies with the requirements of the planning policies set out by the Greater London Authority for Energy Statements and Camden Council.

6) Overheating Risk Assessment

a) It is important to consider the internal comfort conditions for the occupants of the building. At this stage, this can be met through the use of the "cooling hierarchy", as set out in the London Plan. The cooling hierarchy, in Policy SI 4, seeks to reduce any potential overheating and also the need to cool a building through active cooling measures. Air conditioning systems are a very resource-intensive form of active cooling, increasing carbon dioxide emissions, and also emitting large amounts of heat into the surrounding area. By incorporating the cooling hierarchy into the design process buildings will be better equipped to manage their cooling needs and to adapt to the changing climate they will experience over their lifetime.

b) The development shall reduce the potential for overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

   i) Minimise internal heat generation through energy-efficient design to reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation, and green roofs and walls.

   ii) manage the heat within the building through exposed internal thermal mass and high ceilings.

   iii) passive ventilation

   iv) mechanical ventilation

   v) active cooling systems (ensuring they are the lowest carbon options).

c) During this phase, Dynamic Thermal Modelling is carried out for the building to help assess the overheating risk, on CIBSE TM52 and TM 59 Standards as per GLA energy assessment guidance 2022.

d) Based on the Dynamic Thermal Modelling, two spaces in the flat i.e. Master Bedroom 1 and Living/ Dining room said to have a significant risk of solar overheating when modeled with natural ventilation. Therefore for these two rooms, an active cooling system has been proposed. This is acceptable under the requirements of the Building Regulations. The internal heat generation has been minimized through energy-efficient design. All the luminaires shall be low energy which will also remove an internal heat generating load.

e) As per the Approved Document Part O, an initial TM52 assessment was undertaken utilizing the Design Summers Years for the UK. It is expected that the CIBSE compliance criteria are met for the DSY1 weather scenario, modeled under DSY weather files i.e., London LHR DSY1.epw.

f) The Final overheating Results are attached to the appendix section of this report.

8) Carbon Offsets

a) Carbon offset funds provide a source of funds for carbon reduction projects across the cities and have a role in funding emission reductions from existing buildings where achieving carbon savings can be more challenging. Currently, the GLA's recommended price for offsetting carbon varies from £60 per tonne to £95 per tonne depending upon the region. The recommended GLA carbon offset price will be reviewed regularly.

b) Carbon emissions left to offset after the Be Green stage for the building is **3.8 tonnes of CO2**. Therefore, the total cost to offset the Carbon Emission for the period of 30 years for the building (the assumed lifetime of the development's services). Is calculated as follows:

3.89 x £95 x 30 = **£ 11,086.**

However, the payment is not required as this is a refurbishment project and not a new-build, therefore, to make the building net zero, the payment required depends on the sole decision of the council.

9) Conclusion

a) The Local Planning Council and the London Plan 2021 Policy S I 2 require new developments to minimise and exhibit the highest standards of sustainable design and construction.

b) The Application is for the Flat 3, 30 Fitzjohn's Avenue London NW3 5NB. It is proposed that to meet the requirements of policy this development will adopt a high standard of design about energy efficiency principles. It has been estimated that the proposed development will achieve a reduction of at least 24.31% in carbon dioxide emissions through fabric and service efficiencies. It is envisaged that during detailed design, the reduction in carbon dioxide emissions can be improved.

c) This report has assessed the risk of overheating, and the development has been identified as having no significant risk when modeled with a natural ventilation strategy.

d) This Energy and Sustainability Reduction statement demonstrates that the proposed development incorporates low and zero-carbon technologies. It is for these reasons it is considered that this application should be viewed favorably by the Camden Planning Authority.

9) Appendices

a) Full SAP calculations

b) Dynamic Thermal Modelling -Overheating Report

c) Dynamic Thermal Modelling - Results

d) Proposed Air Conditioning Unit.

APPENDIX A -- Full SAP calculations

Summary for Input Data

elmhurst energy

Property Reference	AJ-1380	**Issued on Date**	05/03/2024
Assessment Reference	Proposed	**Prop Type Ref**	Refurbhishment
Property	Flat 3, 30 Fitzjohns Avenue, LONDON, NW3 5NB		

SAP Rating	62 D	**DER**		**TER**	
Environmental	56 D	**% DER < TER**			N/A
CO_2 Emissions (t/year)	3.89	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Giovanni Maurizi	**Assessor ID**	M052-0001
Client	AJ-1380, Florian Bernollin		

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	West
Property Tenture	1
Transaction Type	5
Terrain Type	Urban
1.0 Property Type	Flat, Semi-Detached
Position of Flat	Ground-floor flat
Which Floor	0
2.0 Number of Storeys	1
3.0 Property Age Band	I
4.0 Sheltered Sides	0
5.0 Sunlight/Shade	More than average
6.0 Thermal Mass Parameter	Precise calculation

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	49.30 m	88.00 m²	3.90 m

8.0 Living Area 28.00 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Solid Wall	Other	1.83	135.00	145.25	114.40	0.00	None	30.85	Enter Gross Area
External Wall 2	Solid Wall	Other	1.83	135.00	44.85	44.85	0.50	Stairwell Access Corridor 1	0.00	Enter Gross Area

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	88.00

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	88.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
New Windows	Manufacturer	Window	Double glazed			0.76		0.70	1.40
Existing Windows	SAP table	Window	Single glazed				Wood		4.80

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
West Windows	New Windows	External Wall 1	West	21.50	
South Windows	Existing Windows	External Wall 1	South	4.15	
Opening	Existing Windows	External Wall 1	East	5.20	

Summary for Input Data

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
18.0 Pressure Testing	No	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	Yes	
Cooled Area	47	m²
Data Source	Manufacturer	
Energy Efficiency Ratio	4.77	
22.0 Lighting		
Lighting Capacity Calculation	Estimated Capacity	

Name	Efficacy	Power	Capacity	Count
Compliant Lighitng	200.00	10	2000	10

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17974	
Fuel Type	Mains gas	
In Winter	89.00	
In Summer	80.40	
Model Name	ecoFIT pure 830	
Manufacturer	Vaillant	
System Type	Combi boiler	
Controls SAP Code	2110	
Delayed Start Stat	Yes	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
Combi keep hot type	None	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

Summary for Input Data

elmhurst energy

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
In Airing Cupboard	No

34.0 Small-scale Hydro	None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
		0	0
		0	0
		0	0

Summary for Input Data

elmhurst energy

Property Reference	AJ-1380	Issued on Date	02/03/2024
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Property	Flat 3, 30 Fitzjohns Avenue, LONDON, NW3 5NB		

SAP Rating	51 E	DER		TER	
Environmental	45 E	% DER < TER			N/A
CO_2 Emissions (t/year)	5.14	DFEE		TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER		TPER	

Assessor Details	Mr. Giovanni Maurizi	Assessor ID	M052-0001
Client	AJ-1380, Florian Bernollin		

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3.0 Property Age Band	I
4.0 Sheltered Sides	0
5.0 Sunlight/Shade	More than average
6.0 Thermal Mass Parameter	Precise calculation

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
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12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
New Windows	Manufacturer	Window	Double glazed			0.76		0.70	1.40
Existing Windows	SAP table	Window	Single glazed				Wood		4.80

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
West Windows	Existing Windows	External Wall 1	West	21.50	
South Windows	Existing Windows	External Wall 1	South	4.15	
Opening	Existing Windows	External Wall 1	East	5.20	

Summary for Input Data

elmhurst energy

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
18.0 Pressure Testing	No	
Test Method	Blower Door	
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
21.0 Fixed Cooling System	No	
22.0 Lighting		
Lighting Capacity Calculation	Estimated Capacity	

Name	Efficacy	Power	Capacity	Count
Compliant Lighitng	200.00	10	2000	10

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Fuel Type	Mains gas	
SAP Code	103	
In Winter	74.00	
In Summer	65.00	
Controls SAP Code	2110	
Delayed Start Stat	Yes	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
Combi keep hot type	None	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No

Summary for Input Data

elmhurst energy

Solar Panel	No
Water use <= 125 litres/person/day	No
Cold Water Source	From mains
Bath Count	1

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
In Airing Cupboard	No

34.0 Small-scale Hydro	None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

APPENDIX B – Overheating Risk Assessment

APPENDIX C – Overheating Risk Assessment

Overheating Assessment

Prepared by: Giovanni Maurizi

Site: Flat 3, 30 Fitzjohn’s Ave, London, NW3 5NB.

Client: Florian Bernollin.

Table of Contents

Report Completed By	SAPS
Reviewed By	Giovanni Maurizi
Signature	Giovanni Maurizi

1) Introduction

a) This Overheating Report has been produced by Asaps.co.uk on behalf of the Applicant.

b) The proposed development is a new three-bedroom flat located at 30 Fitzjohn's Avenue London NW3 5NB. This report intends to analyze the use of the air-conditioning unit on the property, and to demonstrate compliance against Part O: Overheating Approved Document, which states in Requirement O1: Overheating mitigation that:

   i) Reasonable provision must be made in respect of a dwelling, institution, or any other building containing one or more rooms for residential purposes to:

      (1) Limit unwanted solar gains in summer.

      (2) Provide an adequate means to remove heat from the indoor environment.

   ii) In meeting the obligations in paragraph (1):

      (1) Account must be taken of the safety of any occupant, and their reasonable enjoyment of residence.

      (2) Mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.

c) In the Secretary of State’s view, compliance with requirement O1 can be demonstrated by using one of the following methods:

   i) The simplified method for limiting solar gains and providing a means of removing excess heat.

   ii) The dynamic thermal modeling method.

d) The dynamic thermal modeling method has been chosen for this development. Therefore, the following standards were followed to achieve compliance:

   i) CIBSE’s TM59 methodology for predicting overheating risk.

   ii) CIBSE TM52 - Limits of thermal comfort provides the principles of thermal comfort and should be the main reference for any additional detail.

e) Acceptable strategies for reducing overheating risk.

   i) Limiting solar gains. Solar gains in summer should be limited by any of the following means:

      (1) Fixed shading devices.

      (2) Glazing design. (Size, orientation, g-value, depth of the window reveal).

      (3) Building design.

      (4) Shading provided by adjacent permanent buildings.

   ii) Removing excess heat. Excess heat should be limited by any of the following means:

      (1) Opening windows.

      (2) Ventilation louvers in external walls.

      (3) A mechanical ventilation system.

      (4) A mechanical cooling system.

f) The building should be constructed to meet requirement O1 using passive means as far as reasonably practicable. It should be demonstrated to the building control body that all practicable passive means of limiting unwanted solar gains and removing excess heat have been used first before adopting mechanical cooling. Any mechanical cooling is expected to be used only where requirement O1 cannot be met using openings.

2) Compliance Criteria

a. In Buildings that are predominantly naturally ventilated, or that have mechanical ventilation with heat recovery (MVHR), with good opportunities for natural ventilation in the summer should assess overheating using the adaptive method based on CIBSE TM52 (2013), as described below.

   i. Compliance is based on passing both of the following 3 criteria:

      1. **Criterion 1: Hours of Exceedance**: The number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 percent of occupied hours.
      2. **Criterion 2: Daily Weighted Exceedance**: ΔT=T op – Tmax not be more than 6 hours. (T op: the actual operative temperature in the room at any time) & (T max: the limiting maximum acceptable temperature.)
      3. **Criterion 3: Upper Limit Temperature:** Criterion 3 sets an absolute maximum temperature of (Tmax + 4) °C for a room (Tupp), beyond which the level of overheating is unacceptable. The overheating risk is assessed between the 1st of May and the 31st of September.

   ii. Criteria 2 and 3 of CIBSE TM52 may fail to be met, but two out of three criteria must be passed for all relevant rooms.

3) Thermal Modelling

b. For overheating assessment, dynamic thermal modeling is performed to analyze the proposed building using IES Virtual Environment (version 2023) software. The following images are 3D views of the assessment sample of the proposed development for the overheating analysis. All images used in this report are technical 3D models created using 2D CAD Drawings (floor plans, sections, and elevations) and are not 3D visualization images.

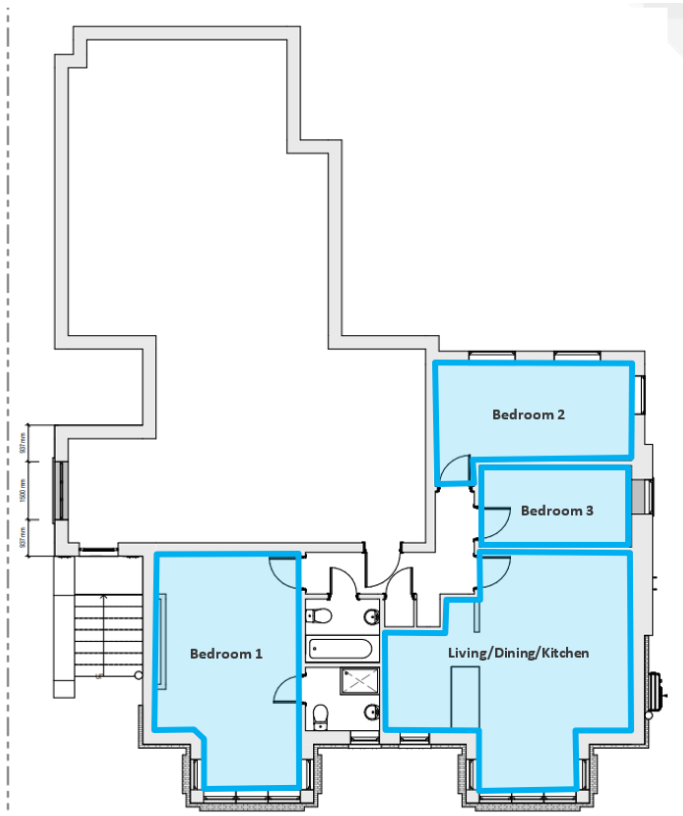


Figure 1 Floor Plan of Proposed Flat

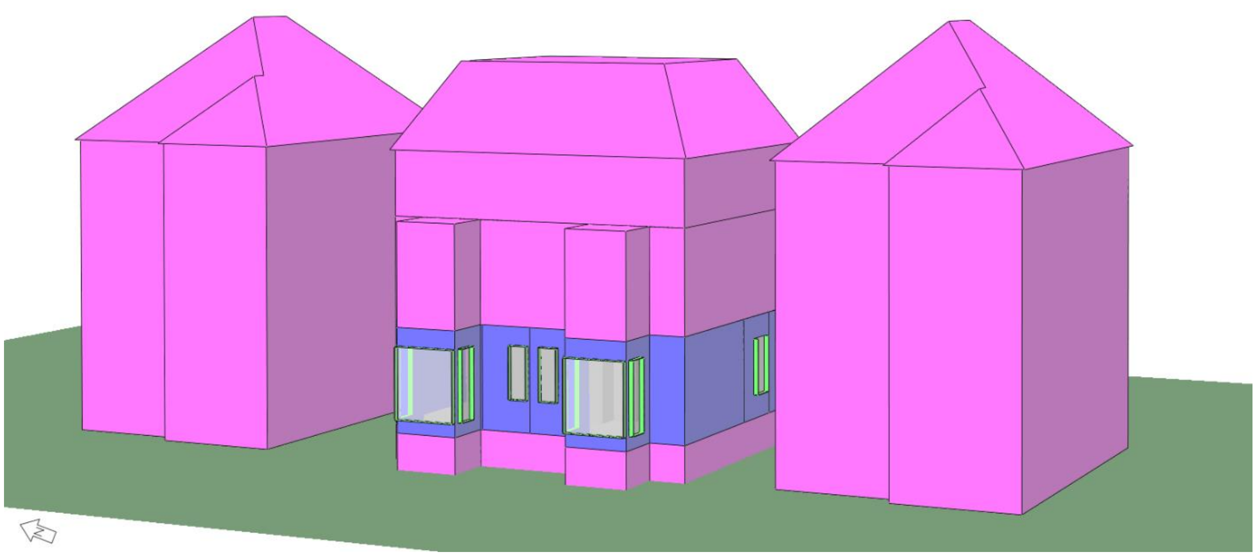


Figure 2 Axonometric View of the 3D model in IES VE

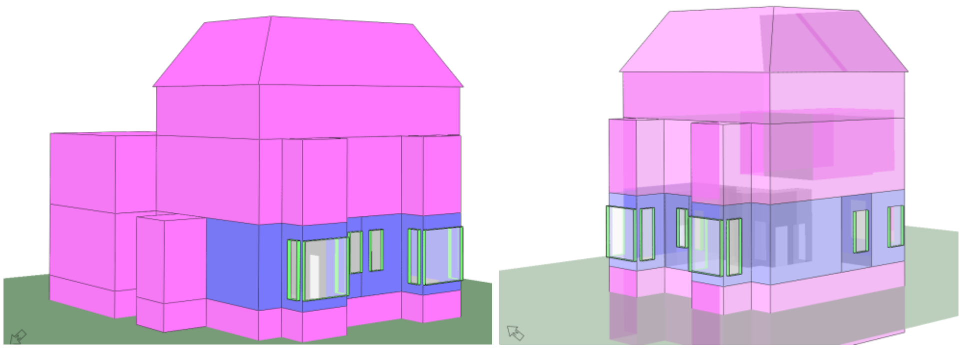


Figure 3 3D Views of 3D Energy Model

The following methodology has been followed to inform the design against different requirements for this project:

a. First, detailed information about the building is gathered from the client.
b. Once it was analyzed and verified complete, all the room types and areas of the building were "zoned" to input those into the interface.

Table 1 Building fabric specifications.

Element	**U-Value (W/m2 k)**	**Further Information**
External walls	1.29 W/m2k	300mm brickwork, 12.5mm plasterboard on dabs.
Ground floor	-	There is no ground floor as the flat is mid-floor.
Roof	-	There is no ground floor as the flat is mid-floor.
Windows	1.40 W/m2k	New double glazing for windows, g value < 0.39, and Visible Light transmittance of 0.71

c. Then a 3D model was carried out with the relevant envelope, internal gain loads, services specifications, and opening details following CIBSE TM52 criteria.
d. Simulation is done with both natural ventilation with windows modeled as open, with windows modeled as closed throughout, and with windows modeled as closed and with the active cooling system.
e. Windows are modeled to open and close based on the limits on CIBSE TM59 Section 3.3 criteria:

a) 2.6 a. When a room is occupied during the day (8 am to 11 pm), openings should be modeled to do all the following:

i) Starts to open when the internal temperature exceeds 22 deg C.

ii) Be fully open when the temperature exceeds 26 deg C.

iii) Starts to close when the Internal temperature falls below 26 deg C.

iv) Be fully closed when the internal temperature falls below 22 deg C.

b) 2.6 b. At night (11 pm to 8 am), openings should be modeled as fully open if both of the following apply:

i) The Openings are on the first floor or above and not easily accessible.

ii) The internal temperature exceeds 23 deg C at 11 pm.

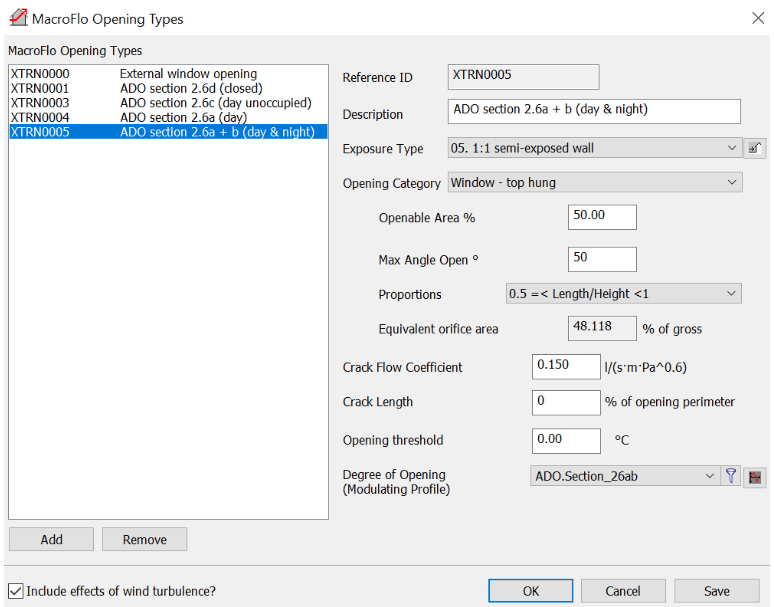


Figure 4 Windows Opening Profiles

4) Internal Gain and Weekly Profiles

i. Occupancy.

1. Based on CIBSE Guide A (2015a), a maximum sensible heat gain of 75 W/person and a maximum latent heat gain of 55 W/person are assumed in living spaces. An allowance for 30% reduced gain during sleeping is based on Addendum g to ANSI/ASHRAE Standard 55-2010.

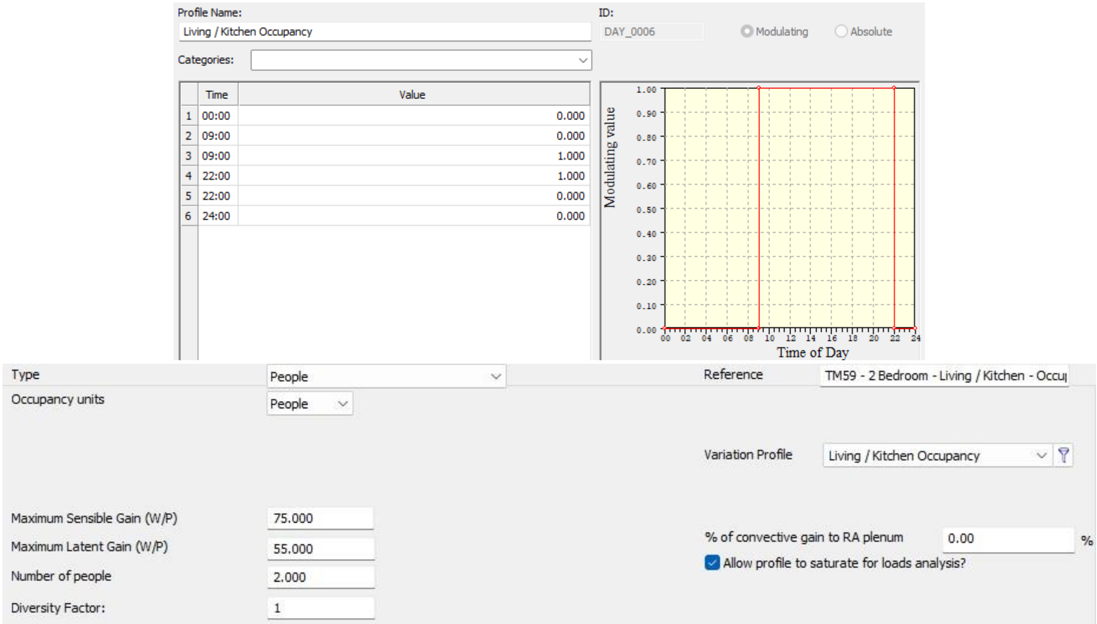


Figure 5 Living/kitchen/dining occupancy profile as per CIBSE TM59 (IES VE inputs)

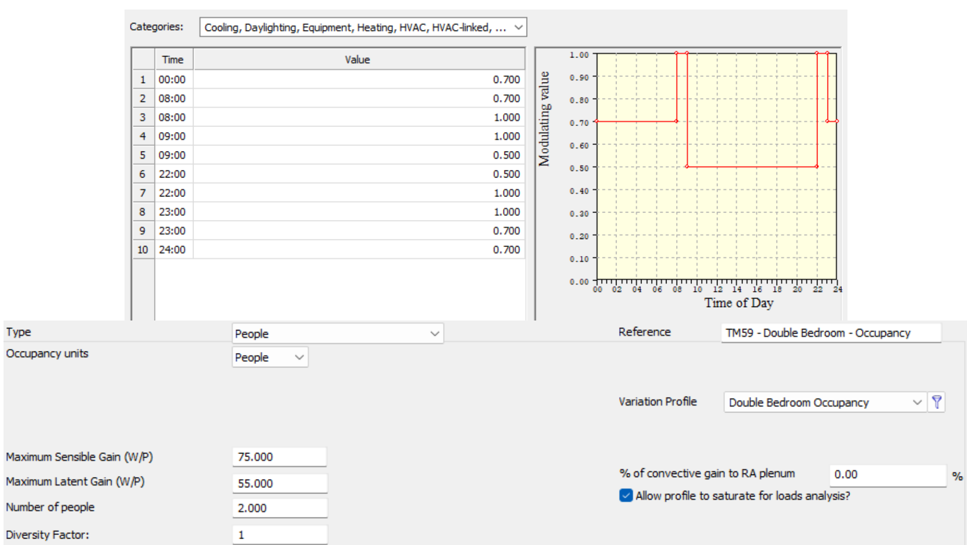


Figure 6 Double Bedroom occupancy profile as per CIBSE TM59 (IES VE inputs)

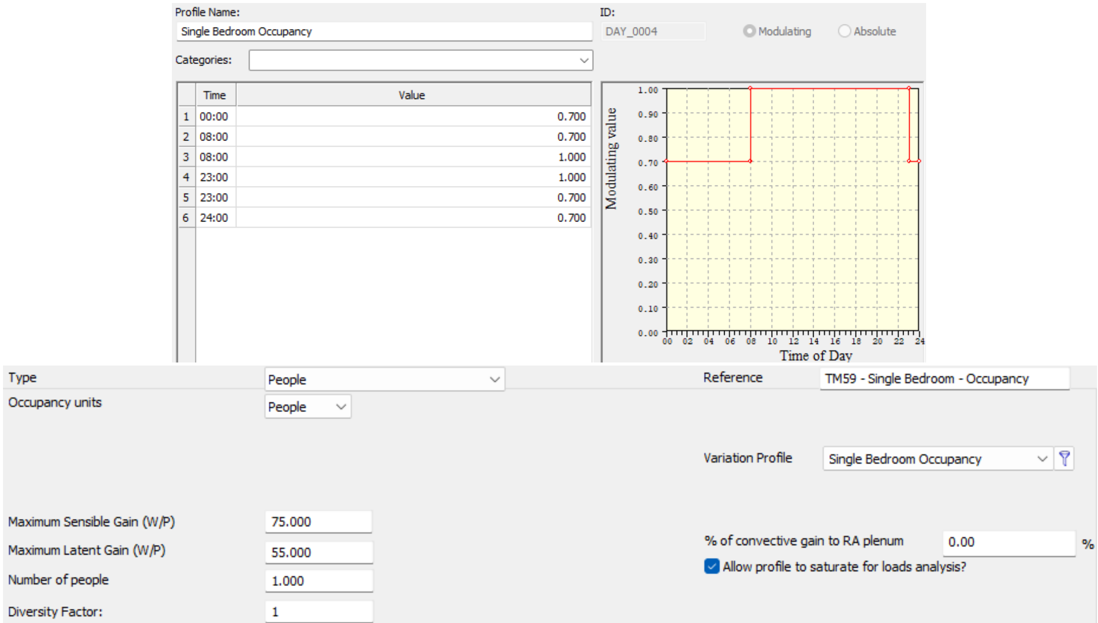


Figure 7 Single Bedroom occupancy profile as per CIBSE TM59 (IES VE inputs

ii. Equipment.

1. Equipment gains based on CIBSE TM 52 Space categories.

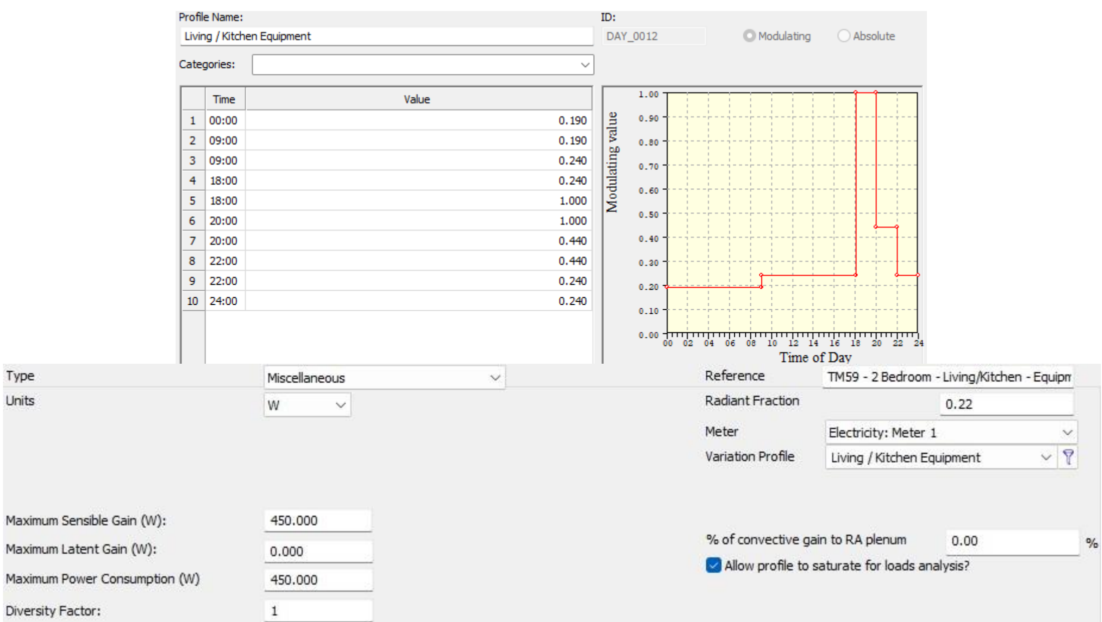


Figure 8 Living/kitchen/dining equipment profile as per CIBSE TM59 (IES VE inputs)

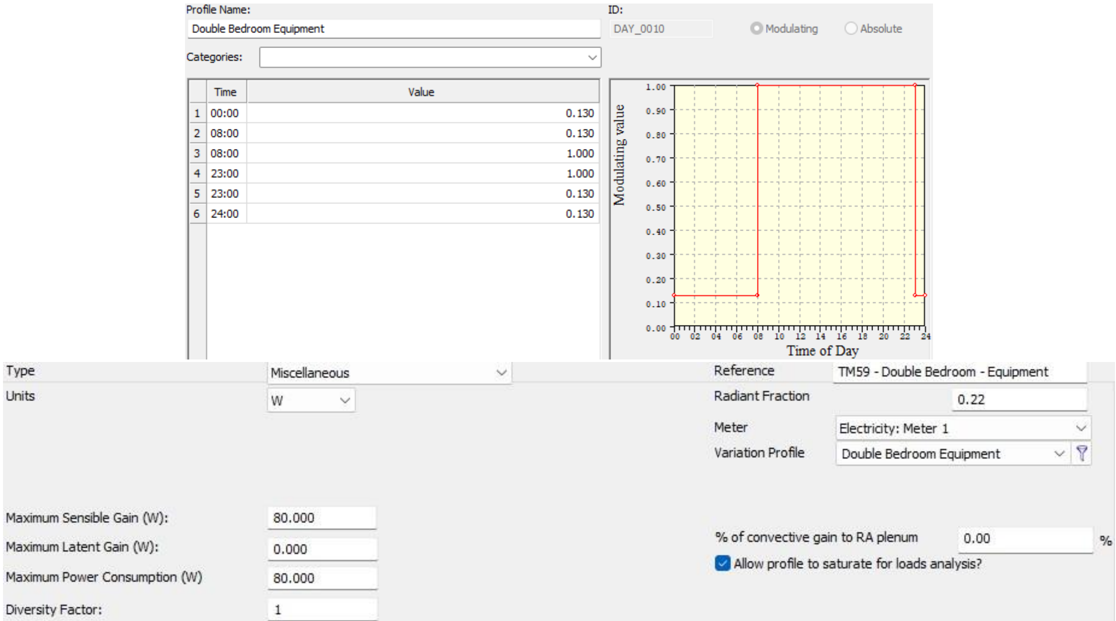


Figure 9 Double bedroom equipment profile as per CIBSE TM59 (IES VE inputs

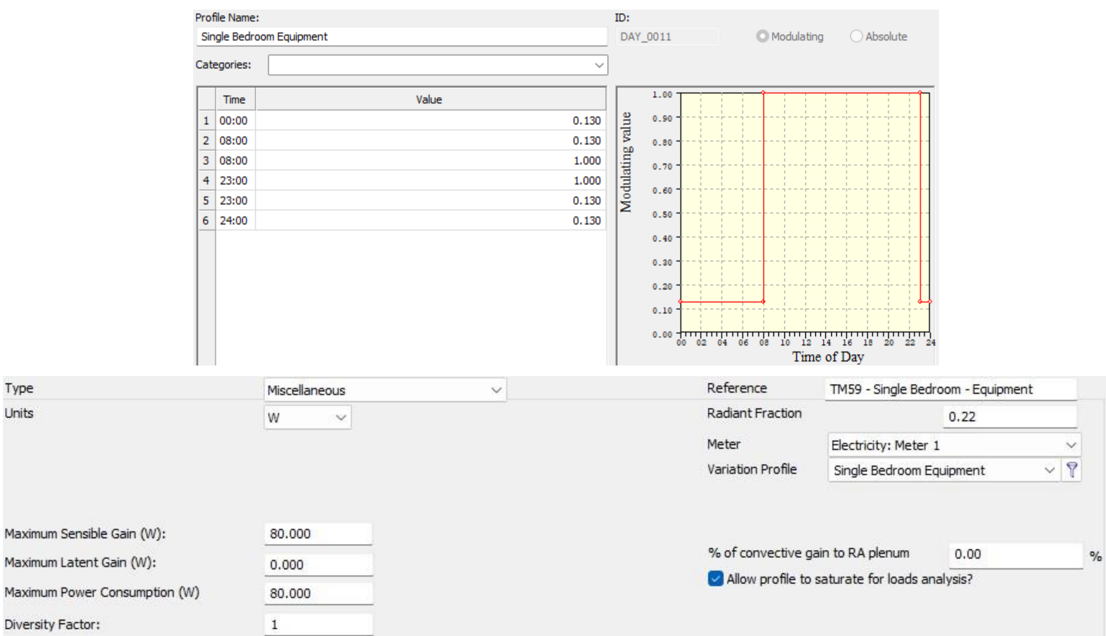


Figure 10 Single bedroom equipment profile as per CIBSE TM59 (IES VE inputs)

iii. Lighting.

1. For the assessment, lighting energy is assumed to be proportional to floor area, and lighting loads are measured in W/m². From 6 pm to 11 pm, 2 W/m² should be assumed as the default for an efficient new-build home. This assumes that good daylight levels are available (also noting that only May to September is assessed within CIBSE TM52).

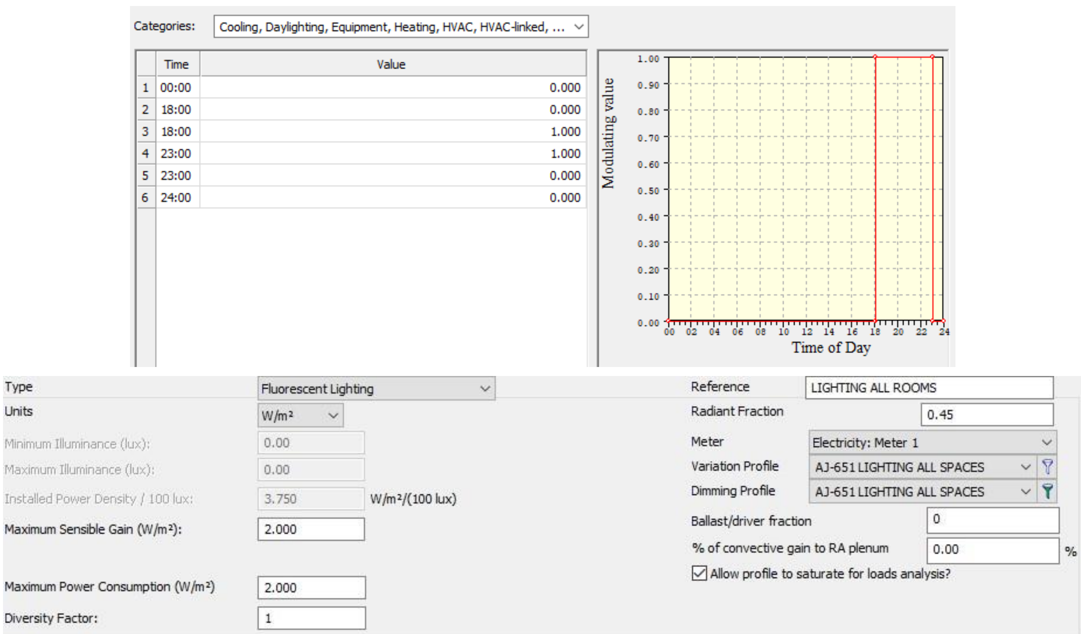


Figure 11 All Rooms lighting profile as per CIBSE TM59 (IES VE inputs

5) Results

c. Dynamic thermal modeling has been undertaken based on the assumptions presented previously in this report.

d. The Rooms are modeled as follows:

i. **Case 1:** Simulations are performed considering natural ventilation with Windows are modeled as opened.

ii. **Case 2:** Simulations are performed with natural ventilation and Internal blinds.

iii. **Case 3:** Simulations are performed with Windows modeled as closed with a split unit air conditioning system to mitigate the overheating risk.

e. **Case 1:** In the natural ventilation mode, From Table 2 below, it has been determined that due to an excessively glazed area on the west façade and only part of the window modeled as open, both Bedroom 1 and Kitchen/Dining/Living space have failed criteria A and B.

Table 2 Results of the Simulation with Natural Ventilation (Case 1)

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Bedroom2	3672	32	0.9	Pass
Bedroom3	3672	21	0.6	Pass
Bedroom1	3672	243	6.6	Fail
Ktichen/Dining	1989	262	13.2	Fail

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Bedroom2	12	1	13	Pass
Bedroom3	2	0	2	Pass
Bedroom1	36	10	46	Fail
Ktichen/Dining	N/A	N/A	N/A	N/A

f. **Case 2:** With the use of internal blinds, it has been determined From Table 3, that although Criteria 1 has been fulfilled for bedroom 1, the Kitchen/Dining room has still failed Criteria 1. According to Part O, Section 2.8 of the Approved document, it states "Although internal blinds and curtains provide some reduction in solar gains, they should not be taken into account when considering whether requirement O1 has been met." The room should pass the CIBSE TM52 criteria without the use of internal blinds.

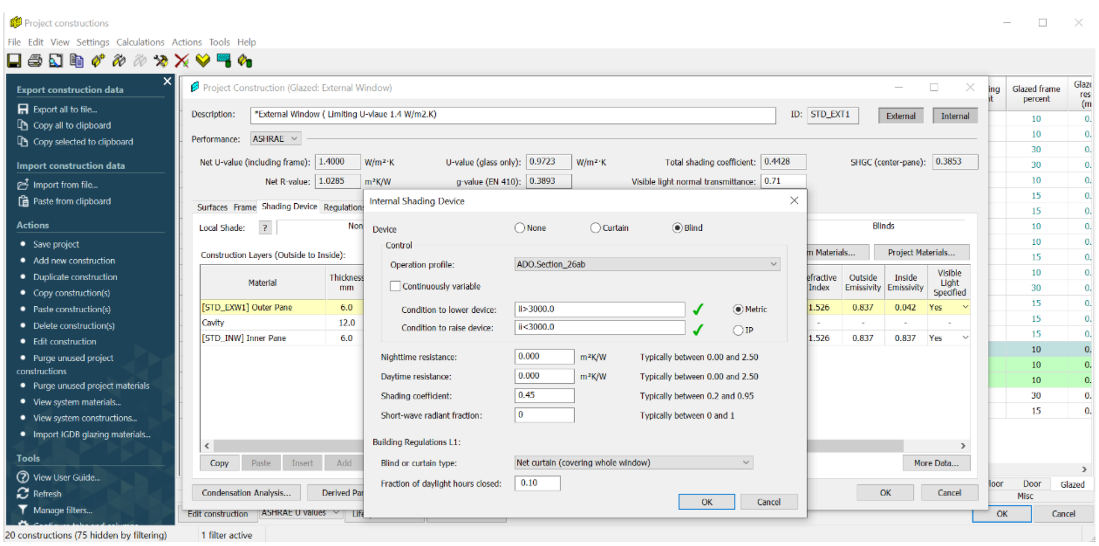


Figure 12 Windows and blinds specifications.

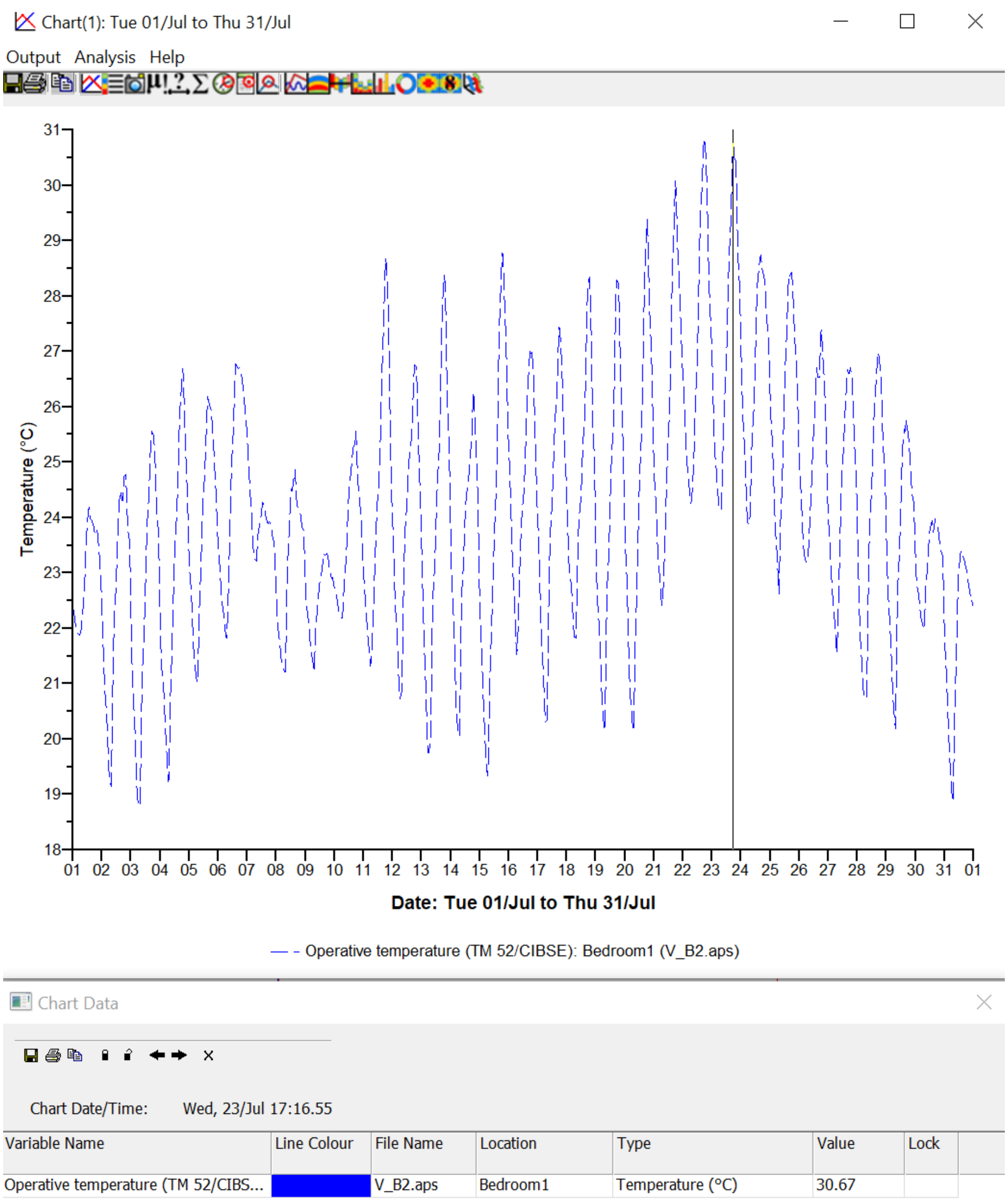
Table 3 Result of Simulation with natural ventilation and internal blinds.

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Bedroom2	3672	19	0.5	Pass
Bedroom3	3672	21	0.6	Pass
Bedroom1	3672	63	1.7	Pass
Ktichen/Dining	1989	107	5.4	Fail

g. Also using the IES VE Vista pro tool, the rise in the expected temperature for both Bedroom 1 and Kitchen/Dining is shown below for the month of July, reaching more than 30 Degrees.


Chart(1): Tue 01/Jul to Thu 31/Jul
Output Analysis Help
Temperature (°C)
31 30 29 28 27 26 25 24 23 22 21 20 19 18
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 01
Date: Tue 01/Jul to Thu 31/Jul
Operative temperature (TM 52/CIBSE): Bedroom1 (V_B2.aps)
Chart Data
Chart Date/Time: Wed, 23/Jul 17:16.55
Variable Name | Line Colour | File Name | Location | Type | Value | Lock
Operative temperature (TM 52/CIBS... | | V_B2.aps | Bedroom1 | Temperature (°C) | 30.67 |

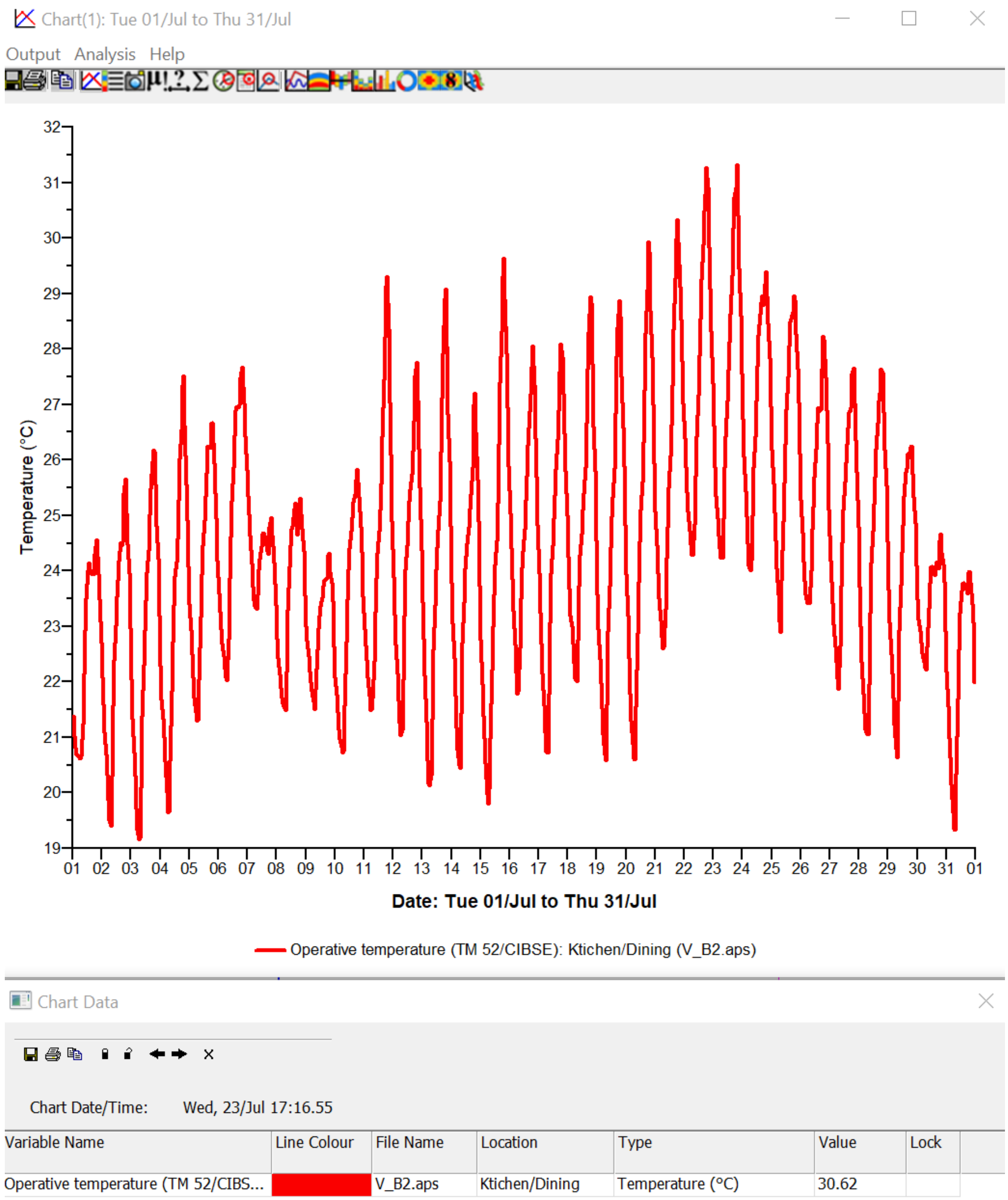


Figure 13 Rise in the Internal Temperature in the month of July.

h. **Case 3:** Use of Mechanical Cooling, i.e. use of air conditioner and Windows of Bedroom 1 and Kitchen/Dining/Living, modeled as closed.

i. From the Table below, with the use of an Air conditioning unit, both rooms have passed the simulations. Also, full results are attached in the Appendix Section of the report.

Table 3 Results from simulation with Mechanical Cooling

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
Bedroom1	0	0.0	Pass
Ktichen/Dining	0	0.0	Pass

j. For Modelling the Split Air Conditioning unit with Indoor and outdoor Units, HVAC Prototype System PTAC 1 from the IES VE Library has been selected with a COP (Coefficient of Performance) of 4.77.

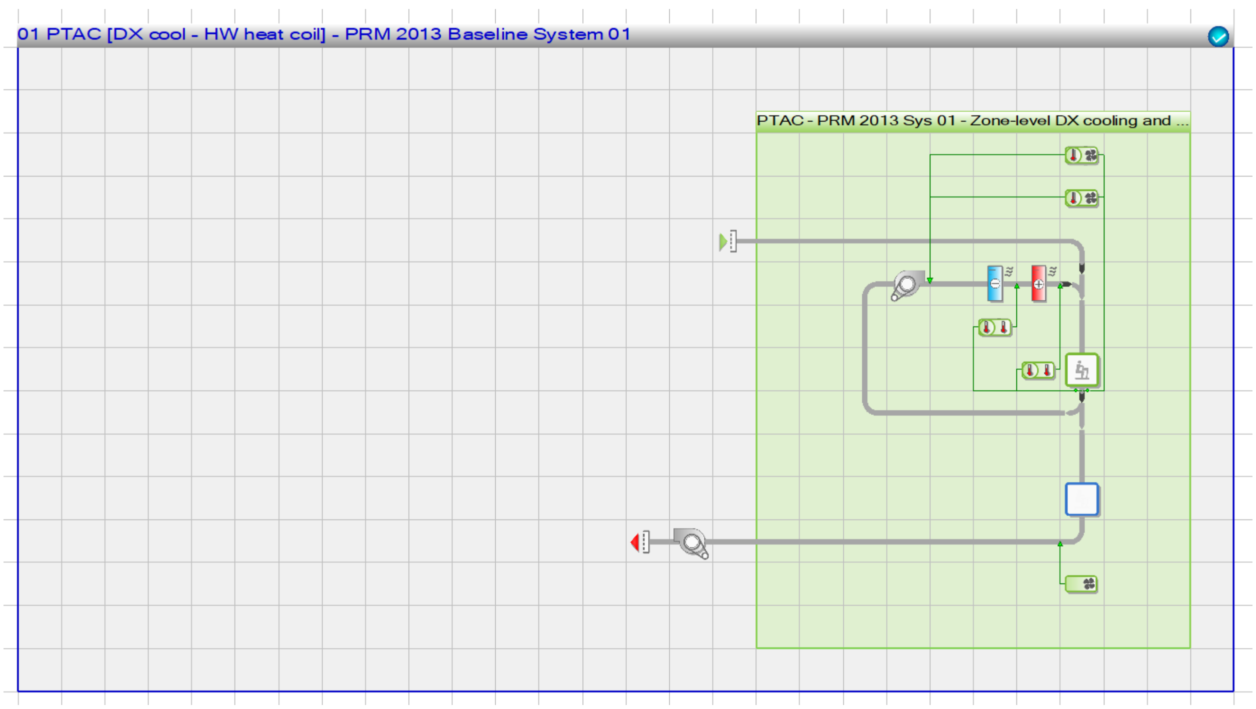


Figure 14 Packaged Terminal Air Conditioning Unit.

6) Conclusion

k. The Local planning council requires the said residential flat to be assessed against the risk of overheating and to check whether mechanical cooling equipment is required to mitigate the risk of overheating, demonstrating compliance with Camden Planning Guidance and the London Plan 2022 – cooling hierarchy.

l. As per the glazed area on the front west façade of the flat, the dwelling has high solar gain, and the Kitchen/Dining room and Master Bedroom have failed to Comply when modeled with natural ventilation. Also, a second simulation is done in which windows are modeled with natural ventilation, and with Internal blinds. Even though Part O of Approved Documents doesn't recommend the use of internal blinds, to comply with TM52 criteria for assessing overheating risk, the criteria still have failed for the Kitchen/ Dining room. Also, for Bedroom 1, even though it passes with blinds, it still has some percentage of hours where the operative temperature gets more than 30 Degrees C. Therefore, to provide optimum thermal comfort for the occupants, it is necessary to Install a split-unit air-to-air conditioning system, serving these two rooms.

m. After Considering Case 3 of the assessments, it has been identified that the dwelling has no significant risk of overheating following the cooling hierarchy.

Approved Document O report
Overheating risk in residential buildings
for
Flat 3

Flat 3

Building details

Project name: Flat 3	Date: 06-03-2024 00:23:24
Location: London Heathrow, United Kingdom	
Address: 30 Fitzjohn's Avenue London NW3 5NB	
Building use: Residential Flat	
Are there any security, noise, or pollution issues: Yes, Noise from Continuous moving Traffic and from Neighbourhood	

Designer's details

Designer's name: Giovanni Maurizi
Designer's organisation: ASAPS
Designer's address: Kettering, Northampton

Dynamic thermal model

Software: IESVE version 2023.2.1.0	
Weather file: London_GTW_DSY1.epw	
Results file: V2.aps	
Number of rooms analysed: 4	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy: Natural ventillation for Bedroom 2 &3 and Mechanical Cooling for Bedroom 1 and Kitchen/Dining Space	
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:	

Flat 3

Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy, Tmax is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Bedroom2	Pass	Pass	-	-
Bedroom3	Pass	Pass	-	-
Bedroom1	-	-	Pass	-
Ktichen/Dining	-	-	Pass	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Bedroom2	3672	6	0.2	Pass
Bedroom3	3672	20	0.5	Pass

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Bedroom2	4	0	4	Pass
Bedroom3	1	0	1	Pass

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
Bedroom1	0	0.0	Pass
Ktichen/Dining	0	0.0	Pass

Flat 3

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Bedroom2	8.5	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Bedroom3	13.84	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Bedroom1	22.11	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Ktichen/Dining	29.96	TM59 - 3 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Bedroom2	22.74	0.3973	1.93, 1.78	20.0, 0.0	4.54	ADO.Section_26ab, off continuously
Bedroom3	24.46	0.3973, 0.3993	2.15, 2.58, 2.58, 1.79	20.0, 20.0, 20.0, 0.0	10.56	ADO.Section_26ab, off continuously
Bedroom1	23.46	0.3973, 0.3973, 0.3973, 0.3973	1.79, 1.58, 1.74, 1.64, 1.66, 1.66, 2.11, 2.11	0.0, 0.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0	9.88	ADO.Section_26ab, ADO.AlwaysOff, off continuously
Ktichen/Dining	21.84	0.3973, 0.3973, 0.3973, 0.3973, 0.3973	1.48, 1.79, 1.73, 1.64, 1.66, 1.65, 2.11, 2.11	20.0, 0.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0	8.26	ADO.Section_26ab, ADO.AlwaysOff, off continuously

Flat 3

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Bedroom2	0.15	0
Bedroom3	0.15	0
Bedroom1	0.15	0
Ktichen/Dining	0.15	0

Approved Document O report
Overheating risk in residential buildings
for

Building details

Project name:	Date: 11-03-2024 00:17:42
Location: London Heathrow, United Kingdom	
Address:	
Building use:	
Are there any security, noise, or pollution issues:	

Designer's details

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

Dynamic thermal model

Software: IESVE version 2023.2.1.0	
Weather file: London_GTW_DSY1.epw	
Results file: V_B2.aps	
Number of rooms analysed: 4	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy:	
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)?	NO
Designer's signature:	

Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy, Tmax is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Bedroom2	Pass	Pass	-	-
Bedroom3	Pass	Pass	-	-
Bedroom1	Pass	Pass	-	-
Ktichen/Dining	Fail	N/A	-	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Bedroom2	3672	19	0.5	Pass
Bedroom3	3672	21	0.6	Pass
Bedroom1	3672	63	1.7	Pass
Ktichen/Dining	1989	107	5.4	Fail

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Bedroom2	11	0	11	Pass
Bedroom3	2	0	2	Pass
Bedroom1	14	3	17	Pass
Ktichen/Dining	N/A	N/A	N/A	N/A

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
No mech vent rooms	N/A	N/A	N/A

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Bedroom2	8.5	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Bedroom3	13.84	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Bedroom1	22.11	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Ktichen/Dining	29.96	TM59 - 3 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Bedroom2	22.74	0.3993	1.93, 1.78	20.0, 0.0	4.54	off continuously, ADO.Section_26ab
Bedroom3	24.46	0.3993, 0.3993	2.15, 2.58, 2.58, 1.79	20.0, 20.0, 20.0, 0.0	10.56	off continuously, ADO.Section_26ab
Bedroom1	23.46	0.3893, 0.3884, 0.3893, 0.3893	1.79, 1.58, 1.74, 1.64, 1.66, 1.66, 2.11, 2.11	0.0, 0.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0	9.88	off continuously, ADO.AlwaysOff, ADO.Section_26ab
Ktichen/Dining	21.84	0.3893, 0.3893, 0.3884, 0.3893, 0.3893	1.48, 1.79, 1.73, 1.64, 1.66, 1.65, 2.11, 2.11	20.0, 0.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0	8.26	off continuously, ADO.AlwaysOff, ADO.Section_26ab

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Bedroom2	0.15	0
Bedroom3	0.15	0
Bedroom1	0.15	0
Ktichen/Dining	0.15	0

Approved Document O report
Overheating risk in residential buildings
for
Flat 3

Flat 3

Building details

Project name: Flat 3	Date: 06-03-2024 00:12:07
Location: London Heathrow, United Kingdom	
Address: 30 Fitzjohn’s Avenue London NW3 5NB	
Building use: Residential Flat	
Are there any security, noise, or pollution issues: Yes, Noise from Continous moving Traffic and from Neighbourhood.	

Designer's details

Designer's name: Giovanni Maurizi
Designer's organisation: ASAPS
Designer's address: Kettering, Northampton

Dynamic thermal model

Software: IESVE version 2023.2.1.0	
Weather file: London_GTW_DSY1.epw	
Results file: V2.aps	
Number of rooms analysed: 4	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy: Natural ventillation for Bedroom 2 &3 and Mechanical Cooling for Bedroom 1 and Kitchen/Dining Space	
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)?	NO
Designer's signature:	

INTEGRATED ENVIRONMENTAL SOLUTIONS

Flat 3

Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy, Tmax is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Bedroom2	Pass	Pass	-	-
Bedroom3	Pass	Pass	-	-
Bedroom1	Fail	Fail	-	-
Ktichen/Dining	Fail	N/A	-	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours ΔT ≥ 1°K	% Occupied hours ΔT ≥ 1°K	Criterion a check
Bedroom2	3672	32	0.9	Pass
Bedroom3	3672	21	0.6	Pass
Bedroom1	3672	243	6.6	Fail
Ktichen/Dining	1989	262	13.2	Fail

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Bedroom2	12	1	13	Pass
Bedroom3	2	0	2	Pass
Bedroom1	36	10	46	Fail
Ktichen/Dining	N/A	N/A	N/A	N/A

Flat 3

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
No mech vent rooms	N/A	N/A	N/A

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Bedroom2	8.5	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Bedroom3	13.84	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Bedroom1	22.11	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Ktichen/Dining	29.96	TM59 - 3 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h

Flat 3

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Bedroom2	22.74	0.3973	1.93, 1.78	20.0, 0.0	4.54	ADO.Section_26ab, off continuously
Bedroom3	24.46	0.3973, 0.3993	2.15, 2.58, 2.58, 1.79	20.0, 20.0, 20.0, 0.0	10.56	ADO.Section_26ab, off continuously
Bedroom1	23.46	0.3973, 0.3973, 0.3973, 0.3973	1.79, 1.58, 1.74, 1.64, 1.66, 1.66, 2.11, 2.11	0.0, 0.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0	9.88	ADO.Section_26ab, ADO.AlwaysOff, off continuously
Ktichen/Dining	21.84	0.3973, 0.3973, 0.3973, 0.3973, 0.3973	1.48, 1.79, 1.73, 1.64, 1.66, 1.65, 2.11, 2.11	20.0, 0.0, 20.0, 20.0, 20.0, 20.0, 20.0, 20.0	8.26	ADO.Section_26ab, ADO.AlwaysOff, off continuously

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Bedroom2	0.15	0
Bedroom3	0.15	0
Bedroom1	0.15	0
Ktichen/Dining	0.15	0

APPENDIX C Proposed Air Conditioning Unit

ELEKTRONIKA S.A.

Outdoor unit SCM80ZS-W

Producer: **Mitsubishi Heavy Industries**
Line: **SCM ZS-W**
Model: **SCM80ZS-W**
Cooling capacity [kW]: **8.00**
Heating capacity [kW]: **9.30**
Power supply: **230V/1Ph/50Hz**

Data

Technical data

Cooling capacity	[kW]	8.00
Minimum cooling capacity	[kW]	1.80
Maximum cooling capacity	[kW]	9.20
Heating capacity	[kW]	9.30
Minimum heating capacity	[kW]	1.10
Maximum heating capacity	[kW]	9.80
Air flow in cooling mode	[m³/min]	56.0
Air flow in heating mode	[m³/min]	56.0
EER		4.71
COP		4.77

Electrical data and ranges

Maximum operating current	[A]	20.0
Power consumption - cooling *	[kW]	1.70
Power consumption - heating *	[kW]	1.95
Power supply		230V/1Ph/50Hz
Outdoor operating temperature range - cooling	[°C]	-15~46
Outdoor operating temperature range - heating	[°C]	-15~24

Acoustic data

Sound pressure - cooling	[dB(A)]	54.0
Sound pressure - heating	[dB(A)]	54.0
Sound power - cooling	[dB(A)]	66.0
Sound power - heating	[dB(A)]	67.0

Installation restrictions

Maximum refrigerant line length	[m]	70
Refrigerant line chargeless length	[m]	30
Vertical height differences (outdoor is lower)	[m]	20
Vertical height differences (outdoor is higher)	[m]	20
Additional refrigerant charge	[g/m]	20

Figure 8: Data sourced from 'www.mhi.com'