ENERGY/SUSTAINABILITY STATEMENT & OVERHEATING ANALYSIS TM52

Proposed three-storey extension to northeast corner of existing hotel and single upward extension. New main entrance façade, exterior cladding and dressing and new fenestration to all windows. Associated works to include internal reconfiguration and repurposing to deliver rooftop restaurant and bar, new large restaurant and bar, new reception and overflow reception, seventeen additional bedrooms together with plant rooms, luggage storage and a new sub-station.

First Inn Venue Wimbledon Ltd Holiday Inn Express

200 High Street – Colliers Wood – SW19 2BH

Control Sheet	
Site Address	Holiday Inn Express – 200 High Street Colliers Wood SW19 2BH
Report Ref:	05502
Prepared by:	**Dr Bilal Alsheglawi**
Proofed	**D Barsted**
Issue No.	1

Summary

1.1 Introduction

This energy strategy has been prepared on behalf of the Applicant, in support of a full planning application for development on the site known as Holiday Inn Express, Wimbledon, Colliers Wood, London, SW19 2BH, hereafter referred to as the Development.

1.2 Policies and Requirements

National Policies
Below outlines the national policies this energy statement has been developed in accordance with:

National Planning Policy Framework
The National Planning Policy Framework sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

Building Regulations Approved Document Part L
Part L of Building Regulations covers the conservation of fuel and power, Notional specifications have been designed as a benchmarking tool to assess against. The DER (Dwelling Emission Rate) can therefore be assessed against the notional specification TER (Target Emission Rate).

Local Policies
Below outlines the local policies this energy statement has been developed in accordance with:

London Borough of Merton
Building upon this, Merton's Draft Local Plan (2021) outlines comprehensive climate change policies (CC2.1 – _CC2.6) aimed at achieving net-zero carbon emissions by 2050. These policies require developments to minimise greenhouse gas emissions by maximising energy efficiency, utilising low-carbon heating solutions, and incorporating renewable energy sources. Developers are expected to submit detailed energy statements demonstrating compliance with these standards.

Policy CC2.2 Minimising Greenhouse Gas Emissions

- To reduce greenhouse gas emissions on-site and minimise both annual and peak energy demand in accordance with the Mayor of London's Energy Hierarchy below:
- Be lean: use less energy and manage demand during operation.
- Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
- Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.
- Be seen monitor, verify and report on energy performance.
- To provide an energy statement demonstrating how emissions savings have been maximised at each stage of the energy hierarchy towards achieving net-zero carbon emissions on site.
- To achieve the relevant minimum carbon reduction targets 35%

Policy CC2.3 Minimising Energy Use
Merton Council will require all proposed development within the borough to demonstrate that they have made the fullest contribution to minimising energy use through energy efficiency on site.

This will be achieved by requiring:

All development resulting in the creation of 1 or more dwellings or 500sqm or more nonpresidential GIA

- To demonstrate how energy demand, including regulated and unregulated uses, has been minimised on site through passive measures and by maximising the efficiency of building form, fabric and systems.
- To disclose the anticipated Energy Use Intensity9 at design and pre-occupation stage

- c. To demonstrate compliance with the following relevant fabric efficiency targets, Space Heating Demand Target from 01 January 202511 <15 kWh/m2/yr

Policy CC2.4 Low Carbon Energy
All proposed developments within the borough must demonstrate that they have made the fullest contribution to supplying energy efficiently and cleanly, and maximising renewable and low carbon energy generation, storage and use, through the deployment of appropriately selected, sized and sited technologies.

This will be achieved by requiring:

- All new development to use low carbon heat.
- All development proposals to demonstrate in the energy statement:
- How the proposal has made the best potential use of roof space to maximise local renewable and low carbon electricity and/or heat generation – _100% of energy demand should be met by renewable energy generation on site wherever possible;
- How appropriate roof spaces have been utilised to maximise the delivery of multi-functional benefits (e.g. co-location of renewable energy and green, brown or blue infrastructure);
- How demand-side response has been incorporated, specifically through the installation of smart meters, minimising peak energy demand and promoting short term energy storage;
- How the proposal has ensured efficient generation of low carbon energy on site; any developments proposing to use heat pumps to demonstrate that these are good quality and achieve a minimum standard of efficiency; and
- How all Major Development proposals located within identified heat network opportunity areas have utilised decentralised energy, or are enabled for connection to current or future district heat networks, unless it is demonstrated that it is not technically feasible to do so.

Policy CC2.5 Minimising Waste and Promoting a Circular Economy
All development proposals should adopt a circular economy approach to building design and construction, and be designed for durability, flexibility and easy disassembly, to reduce waste, to keep materials and products in use for as long as possible, and to minimise embodied carbon.

This will be achieved by requiring:

- Where existing buildings are on site, to prioritise their reuse and retrofit wherever possible before considering the design of new buildings.
- To ensure resource efficiency and reduce embodied carbon emissions by sourcing and prioritising materials, and designing building shapes and forms, that can easily be maintained, repaired and renewed across the development lifetime.
- To minimise the environmental impact of materials by specifying sustainably-sourced, low impact and re-used or recycled materials; this should include identifying opportunities for the retention and reuse of existing materials on site (e.g. re-using demolition material on site). Materials should be locally-sourced wherever possible to minimise transport emissions.

All development resulting in the creation of 30 or more dwellings or 1000sqm or more non-residential GIA, and all development proposing to demolish and rebuild a single dwelling:

- To undertake a Whole Life-Cycle Carbon assessment proportionate to the scale of development and demonstrate actions taken to reduce life-cycle carbon emissions.

Policy CC2.6 Sustainable Design Standards
Merton Council will seek high standards of sustainable design and construction from new development, change of use, conversions and refurbishments to ensure that all development.
makes effective use of resources and materials, minimises water use, and assists in meeting local and national carbon reduction targets.

This will be achieved by:

- Requiring all development to demonstrate that the use of mains water has been minimised by incorporating measures such as smart metering, water saving and recycling measures, including retrofitting where appropriate.
- Requiring all Major Developments and high water use developments to include water saving measures such as rainwater harvesting and greywater recycling to reduce mains water consumption.

Residential development:
Requiring all residential development to meet a minimum internal water efficiency standard of 105 litres per person per day, as set out in Building Regulations Part G or equivalent.

Requiring all conversions and changes to the use of existing buildings resulting in the creation of 10 or more new dwellings to achieve a minimum BREAM Domestic Refurbishment rating of 'Excellent' or equivalent.

Non-residential development:
Requiring all new build non-residential development of 1,000sqm GIA and above to achieve a minimum of BREEAM Non-domestic Refurbishment and Fit-out 'Excellent' standard or equivalent.

Assessment Methodology

- As per the above national and local criteria, the below strategy has been adopted for the site
- As part of the net-zero local carbon target, the development will have no connection to a main gas supply.
- To better reflect the emissions associated with the production of electricity, update fuel factors will be used as part of the assessment.
- The energy hierarchy and a fabric first approach will be utilised.

1.3 Energy Efficiency Measures
The proposed development incorporates several energy efficiency measure and designs to ensure compliance & C02 reduction including:

- Fabric Insulation improvements on Building Regulations Part L minimum standards,
- Air permeability targets implemented as part of the project to minimise heat loss,
- Improved glazing U & G Values for the development,
- Mechanical Ventilation Heat Recovery implemented within the design.
- Low Energy lighting scheme adopted on site.

1.4 Low Carbon Energy Supply
The proposed development does not have a significant thermal demand and is not within an area of which allows for a decentralised energy network to be utilised, therefore this option will not be explored further within this energy statement. The proposed site sits within a Heat Network Priority Area; therefore, it is recommended that the site is development in a manner that will allow to connection to a district heating system in the future is one is to become feasible.

1.5 On-site renewable technologies
The proposed design of the development incorporates the use of **VRF system and Solar PV** to meet the requirements of the local authority. Further options have been reviewed to provide further carbon reductions; the use of on-site renewable technologies has been reviewed in further details within this statement.

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1 Executive Summary

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The proposed design of the development incorporates the use of **VRF system and Solar PV** to meet the requirements of the local authority. Further options have been reviewed to provide further carbon reductions; the use of on-site renewable technologies has been reviewed in further details within this statement.

1.6 Site Description

The proposed development is set at Holiday Inn Express, Wimbledon, Colliers Wood, London, SW19 2BH. The proposed works to the site is the erection of four floors. The proposed extension will contain guestrooms and bar restaurant. The proposed development is to incorporate a high level of thermal performance and incorporate renewable technologies to ensure the new development achieve the local policy requirements.

Figure 1 Ground floor

Figure 2 First Floor

Figure 3 Second Floor

Figure 4 Third Floor

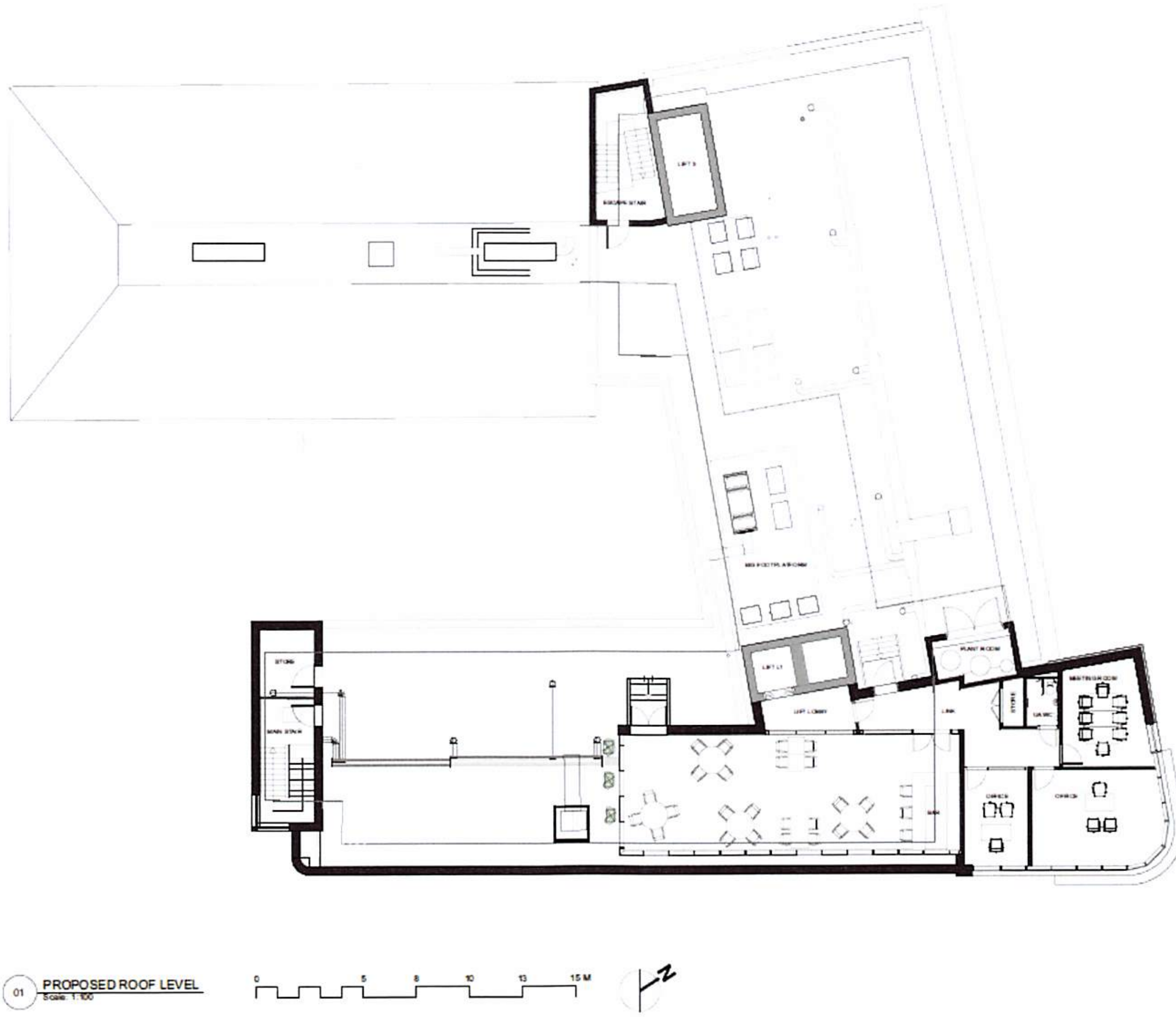


Figure 5 Roof level

1.7 Renewable and Low Carbon Energy

The Energy hierarchy has been utilised to determine the carbon reductions at each stage, the TER/DER figures have been calculated in accordance with Building Regulations Approved Documents

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: Savings from energy demand reduction	0.0	0%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	1.1	35%
Cumulative on site savings	1.1	35%
Cumulative savings for off-set payment	62	-
Cash in-lieu contribution (£)	5,853	-

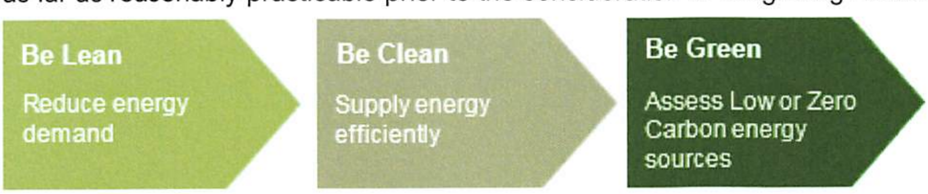
2 Methodology

2.1 Limitations

The calculations and figures utilised within this energy statement are based on Building regulations Part L methodology and should not be understood as a predictive assessment of likely future energy requirements. Other external factors will be present such as occupant system operation patterns and weather patterns.

2.2 Energy Hierarchy

The assessment has been carried out in accordance to the energy hierarchy method in line with GLA policy/s. The energy hierarchy method has been utilised to ensure the design of the development has reduced the demand for energy as far as reasonably practicable prior to the consideration of integrating Low or Zero Carbon technologies.



2.3 Carbon Factors

The below emissions factors have been used within the calculations based on SAP10 emission factors.

Fuel	Emission Factor (kgC0^2/KWh)
Gas	0.210
Electricity	0.213

3 Be Lean Measures

The following sections details the design measures that have been considered/to be implemented at the development.

3.1 Thermal insulation

In order to reduce the overall heating and cooling requirements for the development it is imperative that the development incorporates an efficient thermal envelope. The below elements have been considered for the development.

1. Fabric Insulation improvements on Building Regulations Part L minimum standards,
2. Air permeability targets implemented as part of the project to minimise heat loss,
3. Improved glazing U & G Values for the development,
4. Mechanical Ventilation Heat Recovery implemented within the design.
5. Low Energy lighting scheme adopted on site.

The table below outlines the u-value targets for the development in comparison to the limiting factor set out in Building regulations Part L.

Element	U-Value (W/m²k)
External Façade	0.15
Ground floor	0.18
Roof	0.10
Glazing	U= 1.2 / G =0.63
Air Permeability	5
Low Energy Lighting	130 lm/W
MVHR	Efficiency – 72%

3.2 Fabric Air Permeability

Fabric air permeability is a measure of the volume of air that can penetrate through the fabric of a building leading to ventilation heat loss and gain. An improved air permeability rate has been included within the development to reduce the heat loss and gain and therefore reduce the heating and cooling requirements.

3.3 Improved Glazing Elements

Improvement measures have been made to the glazed elements of the development, the u-values for the glazing whole units are to achieve 1.20 W/m2k. Additional attention should be taken to the solar (G) values for the glazing to control solar gains and overheating.

3.4 Summary of Be Lean Measures

Element	U-Value (W/m²k)
External Façade	0.15
	0.18
Roof	0.10
Glazing	U= 1.2 / G =0.63

Air Permeability	5
Low Energy Lighting	130 lm/W
MVHR	Efficiency – 72%

4 Be Clean Measures

4.1 Low Carbon Energy Supply

The proposed development does not currently have a supply available from an energy network or low carbon supply. However it is recommended that is any connection is made available in the future, the development is made to be ready to connect to the network.

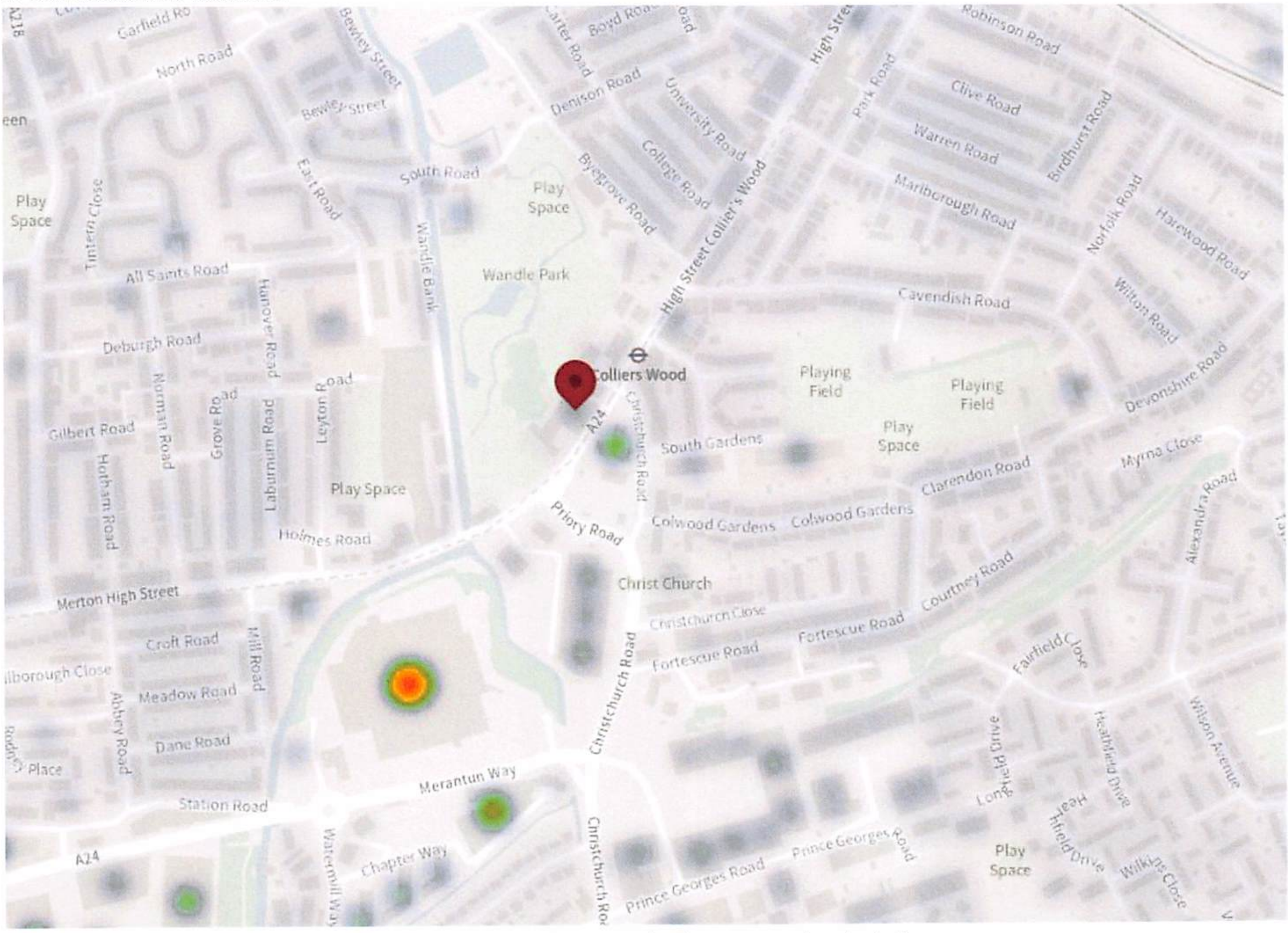


Figure 6 London heat map for the proposed project site

5 Be Green Measures

The following sections discuss the renewable energy generation measures that have been considered, and those which will be implemented at the Development.

Renewable technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available. However, not all these are commercially viable, suitable for city-centre locations or appropriate for the Development.

Technologies considered for the Development include:

- Solar Hot Water Panels (Solar Thermal)

- Photovoltaic (PV) Cells
- Combined Heat and Power (CHP) and Micro-CHP (mCHP)
- Ground Source Heat Pumps (GSHP)
- Air Source Heat Pumps (ASHP)
- Wind Turbines

5.1 Solar Hot Water Panels

Solar Hot Water Panels or, Solar Panels as they are commonly known, are used to supplement the energy required for the domestic hot water requirement. The system will collect and absorb solar radiation and transfer the heat directly to the storage tank. The circulation may then be either 'passive' thus relying on the natural convection or 'active' using a pump which increases a system's efficiency but has additional costs for the controls and energy requirement.

There are two main types of solar panel collector available to the UK market. The first is Flat Plate Collectors which consist of a dark absorber sheet with pipes built into the sheet encased in a weatherproof box. This will pump the collected solar radiation to the storage device to heat the water for use. The second main system is Evacuated Tube Collectors. These devices are more efficient and are effective under a "...wider range of conditions..." (TM38:2006) due to the energy being drawn from "...light rather than outside temperature..." This therefore allows this type of system to adapt to cooler climes.

Solar Hot Water Panels have been deemed possible for this development due to the available roof space, however based on the proposed DHW system and the potential of a more suitable technology, this technology has not been explored further or selected for this site.

5.2 Photovoltaic (PV) Cells

Solar panel electricity systems, also known as solar Photovoltaics' (PV), capture the sun's energy using photovoltaic cells. These cells do not need direct sunlight to work - they can still generate some electricity on a cloudy day. The cells convert the sunlight into electricity, which can be used to run household appliances and lighting.

PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on your roof.

The power of a PV cell is measured in kilowatts peak (kWp). That is the rate at which it generates energy at peak performance in full direct sunlight during the summer. PV cells come in a variety of shapes and sizes. Most PV systems are made up of panels that fit on top of an existing roof, but you can also fit solar tiles.

Photovoltaic (PV) Cells have been considered and have been deemed viable for this site, the proposed system is 12kw.

Location	Roof Mounted
Acoustic considerations	No acoustic considerations
Groundworks	No groundwork considerations
Export possible	Yes, export possible to grid
Maintenance	To maintain the solar PV panels, it is to be ensure that access to the panels will be provided, this is to ensure that periodic cleaning and maintenance

	can be carried out. Additionally, generation is to be monitored and record to be able to identify any generation/panel malfunctions.
Service Life	25 Years

5.3 Combined Heat and Power (CHP) and Micro-CHP (mCHP)

Micro-CHP' stands for micro combined heat and power. This technology generates heat and electricity simultaneously, from the same energy source, in individual homes or buildings. The main output of a micro-CHP system is heat, with some electricity generation, at a typical ratio of about 6:1 for domestic appliances.

A typical domestic system will generate up to 1kW of electricity once warmed up: the amount of electricity generated over a year depends on how long the system is able to run. Any electricity you generate and don't use can be sold back to the grid.

Domestic micro-CHP systems are currently powered by mains gas or LPG; in the future there may be models powered by oil or bio-liquids. Although gas and LPG are fossil fuels rather than renewable energy sources, the technology is still considered to be a 'low carbon technology' because it can be more efficient than just burning a fossil fuel for heat and getting electricity from the national grid. Micro-CHP systems are similar in size and shape to ordinary, domestic boilers and like them can be wall hung or floor standing. The only difference to a standard boiler is that they are able to generate electricity while they are heating water.

For the householder, there is little difference between a micro-CHP installation and a standard boiler. If the dwelling already has a conventional boiler then a micro-CHP unit should be able to replace it as it's roughly the same size. However, the installer must be approved under the Micro generation Certification Scheme. Servicing costs and maintenance are estimated to be similar to a standard boiler – although a specialist will be required.

CHP and mCHP have been considered for the project, in order to house the system, an external additional plant area would be required and therefore the feasibility of the CHP has not been deemed acceptable or viable due to planning restrictions. Additionally, the carbon reductions for the mCHP system does not meet the Local Authority requirements due to the low heat demand.

5.4 Ground Source Heat Pumps (GSHP)

Ground source heat pumps use pipes which are buried in the garden to extract heat from the ground. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in the home.

A ground source heat pump circulates a mixture of water and antifreeze around a loop of pipe - called a ground loop - which is buried in the garden. Heat from the ground is absorbed into the fluid and then passes through a heat exchanger into the heat pump. The ground stays at a constant temperature under the surface, so the heat pump can be used throughout the year - even in the middle of winter.

The length of the ground loop depends on the size of the home and the amount of heat needed. Longer loops can draw more heat from the ground, but need more space to be buried in. If space is limited, a vertical borehole can be drilled instead. Running costs will depend on several factors - including the size of the dwelling and how well insulated it is.

Ground Source Heat Pump has been considered for this project and has not been deemed viable due to the available external space. A more suitable technology has been selected to reduce the carbon emissions as well as financial and on-site feasibility.

5.5 Air Source Heat Pumps (ASHP)

Air source heat pumps absorb heat from the outside air. This heat can then be used to heat radiators, underfloor heating systems, or warm air convectors and hot water in dwellings.

An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can get heat from the air even when the temperature is as low as -15° C. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground, air, or water is constantly being renewed naturally.

Running costs will vary depending on several factors - including the size of the home, and how well insulated it is, and what room temperatures are achieved.

Air Source Heat Pump has been considered for the project and deemed a viable option for the project due to the external plant space available, the potential of roof mounted ASHP was considered with COP of 5.31 and EER of 4.69

5.6 Wind Turbines

Wind turbines harness the power of the wind and use it to generate electricity. Forty percent of all the wind energy in Europe blows over the UK, making it an ideal country for domestic turbines (known as 'microwind' or 'small-wind' turbines). A typical system in an exposed site could easily generate more power than a dwelling's lights and electrical appliances use.

Wind turbines use large blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced. There are two types of domestic-sized wind turbine:

Pole mounted: these are free standing and are erected in a suitably exposed position, often around 5kW to 6Kw

Building mounted: these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size. Wind turbines are eligible for the UK government's Feed-in-Tariffs which means money can be earned from the electricity generated by the turbine. Payments for the electricity not use and export to the local grid are available as well. To be eligible, the installer and wind turbine product must be certified under the Microgeneration Certification Scheme (MCS). If the turbine is not connected to the local electricity grid (known as off grid), unused electricity can be stored in a battery for use when there is no wind. Please note that the Feed-in Tariffs scheme is not available in Northern Ireland.

Wind Turbines have been considered for this project, Pole mounted wind turbine has been excluded due to nature of the development and building mounted would not achieve the required reductions on site to meet the local requirements, therefore this has not been explored further.

5.7 Biomass

Energy from Biomass is produced by burning organic matter. Biomass fuel sources include trees, crops or animal dung are "...harvested and processed to create energy in the form of Electricity, Heat and Steam." (TM38:2006) Biomass is carbon based and when used as a fuel, produces carbon emissions. However, the carbon emitted during the combustion process is "...equivalent to the amount absorbed during growth..." (TM38:2006) The only carbon emissions associated with this energy source is treatment and transportation costs of the fuel to the end user.

Carbon savings that can be attributed to this technology type are significant. Biomass boiler installation can "...deliver all of the heating requirements for a building...using an almost carbon neutral fuel source." (TM38:2005) Biomass can be cost effective when directly compared to convention as oil and electricity heating sources. The benefit can be increased when the biomass source, for example wood chips, is diverted from the waste stream. However, maintenance requirements of a biomass system are higher and should be taken into account when installing one. Additionally, the UK introduced the Clean Air Act (1993) (www.uksmokecontrolareas.co.uk) to control the smoke pollution in areas caused by burning of smoky fuels.

Biomass been considered for the project, in order to house the system, an external additional plant area would be required and therefore the feasibility of the CHP has not been deemed acceptable or viable due to planning restrictions. If planning restrictions are limited on Biomass it is recommended to review the financial feasibility as the Biomass option exceeds the planning requirements.

5.8 Summary of Be Green Measures

Technology	Deemed Viable	Adopted on site
Solar Hot Water Panels (Solar Thermal)	✖	✖
Photovoltaic (PV) Cells	✔	✔
Combined Heat and Power (CHP) and Micro-CHP (mCHP)	✖	✖
Ground Source Heat Pumps (GSHP)	✖	✖
Air Source Heat Pumps (ASHP)	✔	✔

Wind Turbines	✖	✖
Biomass	✖	✖

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: Savings from energy demand reduction	0.0	0%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	1.1	35%
Cumulative on site savings	1.1	35%
Cumulative savings for off-set payment	62	-
Cash in-lieu contribution (£)	5,853	-

6. Conclusion

After reviewing the above renewable technologies, VRF system and Solar PV have been identified as the most viable options to achieve the criteria set out by the local authority. The development has been deemed viable for additional measures and therefore it is recommended to explore the financial feasibility of these options to maximise the reduction in carbon emissions on site. The key focus on site was to minimise heat loss and reduce the regulated energy consumption on-site through utilisation of the energy hierarchy.

6.1 Summary of energy efficient measures

Element	U-Value (W/m^2k)
External Façade	0.15
	0.18
Roof	0.10
Glazing	U= 1.2 / G =0.63
Air Permeability	5
Low Energy Lighting	130 lm/W
MVHR	Efficiency – 72%

6.2 Summary of renewable or Low Carbon measures

Element	
Main Heating System	MITSUBISHI Electric Air Conditioning VRF HR
Hot Water System	Mitsubishi Heavy Industries Air To Water Heat Pump Q-Ton ESA30E-25 30Kw/102000Btu R744 415V~50Hz. 500L
Renewable Technologies	12 KWp Solar PV
Mechanical Ventilation Heat Recovery System	LOSSNAY LGH25RVX-E-1, Efficiency: 72%

Overheating analysis TM52

7. Executive Summary

Thermal Overheating modelling has been undertaken on the proposed site Holiday Inn Express, Wimbledon, Colliers Wood, London, SW19 2BH. This is to determine the impact of summer overheating in accordance with CIBSE guide TM52 , IES VE software has been used to undertake the assessment and has been designed in accordance to AM11, TM52, NCM guides & CIBSE Guide A. The model has been created in accordance with the below architectural drawings.

- 5823-P3-111 PROPOSED GROUND FLOOR PLANWD 103c proposed elevations
- 5823-P3-112 PROPOSED FIRST FLOOR PLAN
- 5823-P3-113 PROPOSED SECOND FLOOR PLAN
- 5823-P3-114 PROPOSED THIRD FLOOR PLAN
- 5823-P3-115A PROPOSED ROOF LEVEL
- 5823-P3-125 PROPOSED SOUTHEAST ELEVATION
- 5823-P3-126 PROPOSED NORTH ELEVATIONS
- 5823-P3-130 PROPOSED SECTIONS

8. Project Overview

The proposed project is a hotel, consist of existing building and extension building built in accordance with the standards set out in Building Regulations Approved Documents. The hotel is predominantly naturally ventilated and incorporates good levels of insulation, air permeability and low carbon heating.

9. TM52 Overheating Criteria

Guidance set out in CIBSE TM52 defines a room to be subject to overheating if two or more of the below criteria does not meet the required standards, London DSY1 weather file has been selected in this instance due to the rural nature of the site, the weather data does present a lower temperature range than that of more urban locations, however based on the terrain and characteristics of the development this file has been selected.

9.1 TM52 Overheating Criterion 1

Criterion 1: Hours of Exceedence

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°K or more during the occupied hours of a typical non—heating season (1 May to 30 September).

This criterion is assessed as follows:

The number of hours (H_e) 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 per cent of occupied hours.

Where:

$\Delta T = T_{OP} - T_{MAX}$

Where:

T_{OP} = *Actual operative temp in a given room*
T_{MAX} = *The limiting maximum acceptable temperature*

Where:
$T_{MAX} = 0.33T_{RM} + 21.8$

Where:

T_{RM} =*the running mean of the outdoor air temperature*

9.2 TM52 Overheating Criterion 2

Criterion 2: Daily weighted Exceedance

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a function of both temperature rise and its duration. This criterion sets a daily limit for acceptability.

To allow for the severity of overheating the weighted exceedance (W_E) shall be less than or equal to 6 in any one day where:

$W_E = (\sum h_E) \times WF$

$= (h_{e0} \times 0) + (h_{e1} \times 1) + (h_{e2} \times 2) + (h_{e3} \times 3)$

Where the weighted factor WF = 0 if $\Delta T \leq 0$, otherwise WF = ΔT, and h_{ey} is the time (h) when WF = y.

9.3 TM52 Overheating Criterion 3

Criterion 3: Upper limit Temperature

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed 4°K.

10 Overheating Model and Simulation Software

10.1 Simulation Software

The software used to model this simulation is IES VE (Virtual Environment), the following applications within IES VE have been utilised throughout the simulation process.

- IES Model IT
- IES Apache
- IES Macroflo
- IES VE Compliance (UK & Ireland)

10.2 Weather Files

During the analysis a number of different weather files have been used to review the overheating for both current and future climates as set out below:

- London_LHR DSY 1,2 & 3 2020 High 50
- DSY files 2 & 3 are reviewed in report.

10.3 Model Images

Figure 1 Model view

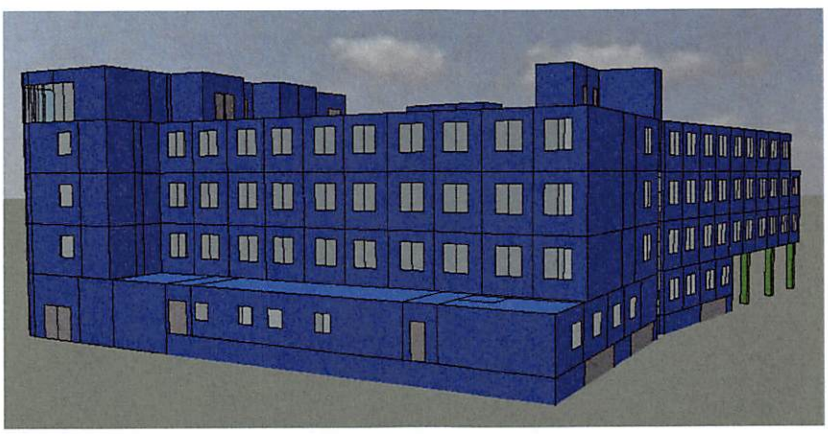


Figure 2 Model view

11 Construction Fabric Specifications

The below table outlines the fabric U-Values used within the model, these elements are to be confirmed on site and if any alterations are made throughout the design process the simulations should be reran to ensure that the outcomes have not altered.

11.1 Fabric Overview

Table 1 Fabric Details

Element	Extension building U-Value (W/m2K)
External walls	0.15
Internal Partitions	1.8
Roof	0.10
Ground Floor	0.18

11.2 Glazing Specification

Table 2 Glazing details

U-Value (W/m2K)	G-Value	Glazed Percentage	Frame Material
1.2	0.63	N/A	Metal

11.3 Air Permeability

The Air permeability rate for the proposed site has target of 5 and expresses as an infiltration rate of 0.25 ACH.

12 HVAC Specification

The proposed building is to be heated using MITSUBISHI Electric Air Conditioning VRF HR HIGH COP Model: PURY-P250YNW-A1, controlled via zones.

12.1 Heating Specifications

Table 3 Building heating details

Space Type	Heating Setpoint (°C) (Real)	Cooling Setpoint (°C) (Real)
Living Areas	21	N/A
Kitchen Dining Areas	21	N/A
Bedrooms	21	N/A
Circulation Areas (Corridors)	19	N/A
Bathrooms & En-Suites	19	N/A
Study	19	N/A
Store	19	N/A

12.2 Mechanical Ventilation

The proposed development does incorporate a 'whole dwelling' ventilation system (MVHR) with 72% efficiency, wet rooms will contain exhaust fans with a SFP of 0.25 W(l/s).

13 Natural Ventilation

The hotel ventilation will rely on a Variable Refrigerant Flow (VRF) system for cooling and a Mechanical Ventilation with Heat Recovery (MVHR) system for fresh air supply and ventilation. Guestroom windows will be fixed.

13.1 Windows Openings Profiles and Types

Table 4 TM52 Windows opining and types of profiles

Opening Type	Profile	Opening Specifications
External Window Opening Doors	Linked to occupancy	Guestrooms fixed windows

All windows have been designed according to individual locations, sizes, orientations, and designs; it is also recommended that the openings have opening functions linked to internal C02 levels.

Figure 3 Opening type

Figure 4 Opening type

14 Internal Gains, Profiles and Air Exchanges

NCM: UK-Hotel-Large-Guest room

Internal Gains	Maximum Sensible Gain	Maximum Latent Gain	Occupation Density
Occupation	75 W/Person	50 W/Person	10 m2/Person
Lighting	8 W/m2		
Equipment	N/A	N/A	

NCM: UK-Hotel-Eating/Drinking area

Internal Gains	Maximum Sensible Gain	Maximum Latent Gain	Occupation Density
Occupation	67.10 W/Person	42.90 W/Person	5.34 m2/Person
Lighting	10 W/m2		
Equipment	15 W/m2	15 W/m2	

15 Calculation Results

15.1 DSY1 2020 High 50

Table 5 Overheating summary

Room Name	Occupied	Criteria 1	Criteria 2	Criteria 3	Failing Criteria
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
RL-Bar-restaurant	100	2.2	6	1	-
RL-Office	100	0	0	0	-
RL-Office	100	0	0	0	-

15.2 DSY 2 Result

Room Name	Occupied	Criteria 1	Criteria 2	Criteria 3	Failing Criteria
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
RL-Bar-restaurant	100	0.2	3	1	-
RL-Office	100	0	0	0	-
RL-Office	100	0	0	0	-

15.3 DSY 3 Result

Room Name	Occupied	Criteria 1	Criteria 2	Criteria 3	Failing Criteria
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
GF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
FF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
SF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
TF-Bedroom	100	0	0	0	-
RL-Bar-restaurant	100	0.4	2	1	-
RL-Office	100	0	0	0	-
RL-Office	100	0	0	0	-

16 Summary

Overheating analysis has been undertaken on the proposed development at Holiday Inn Express, Wimbledon, Colliers Wood, London, SW19 2BH. the development meets the criteria set out in TM52 for naturally ventilated buildings for DSY1.

Table 6 Summary

1 Modelling Details		
Dynamic software name and version	IES Virtual Environment Version 2022.1.2.0	
Weather file location used, including any additional, more extreme weather files	London_LHR DSY1,2 &3 2020 High 50	
Number of sample units modelled, including an explanation of why the size/selection has been chosen		
2 Modelled occupancies		
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?(1)	Yes	No
Details of the occupancy profiles used	TM52 (detailed in report)	
Details of the equipment profiles used	TM52 (detailed in report)	
Details of the opening profiles used	Bespoke in line with TM52 (detailed in report)	
3 Modelled overheating mitigation strategy		
Free areas	Calculated in model	
Infiltration and mechanical flow rates	0.25	
Window g-value	N/A	
Shading strategy	N/A	
Mechanical cooling	Yes/VRF and MVHR	
4 Modelling results		
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	Yes	No
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	VRF/MVHR	
5 Designer's declaration		
Has the building construction proposal been modelled accurately?	Yes	No
Consultant's name	Dr Bilal Alsheglawi	
Consultant's signature		
Date	14/02/2025	