LONDON SQUARE DEVELOPMENTS LTD

FORMER GREGGS BAKERY SITE
TWICKENHAM
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Energy Strategy and LZC Report
Industrial-Led Scheme

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Edition	Date	Amendments
1	3rd March 2022	Residential & Industrial Scheme
2	5th April 2022	Updated Planning Submission
3	15th July 2022	Updated Industrial Unit
4	20th July 2022	Minor amendments
5	17th March 2023	Costs updated to £95/tonnes and payment based on site wide CO2 figures
6	5th May 2023	Report updated to current Building Regulations & GLA Energy Assessments
7	12th May 2023	Wording amended

EXECUTIVE SUMMARY

Development Description

The project comprises of the Demolition of existing buildings (with retention of a single dwelling) and redevelopment of the site to provide 97 residential units and 883 sqm industrial floorspace (Use Class E(g)(iii)) and 117sqm of affordable workspace (Use Class E) with associated hard and soft landscaping, car parking and highways works and other associated works.

This report outlines the proposed measures for achieving the planning policy requirements set by the local authority for reducing energy consumption and employing Low Zero Carbon (LZC) energy sources to meet the following targets:

- To meet guidance wherever possible as defined in the GLA Energy Assessment Guidance dated June 2022.
- To meet London Plan 2021 targets with respect to CO_2 emissions and other energy targets and methods.
- To minimise and eradicated overheating in dwellings in line with CIBSE standards.
- To consider LZC technologies to reduce energy consumption.
- To consider overheating in dwellings in line with GLA methodology for overheating risk analysis.
- Non-residential spaces – To achieve the mandatory number of ENE04 credits for an 'Excellent' BREEAM rating.

Current research into local heat networks within the Twickenham area, shows that no existing heat networks are within the vicinity of the site and there currently no proposals for any heat networks in consideration within the local area.

Planning stage analysis indicates that the installation LZC air source heat pumps and roof mounted photovoltaic cells in conjunction with high levels of insulation, good air tightness and good artificial lighting performance enables the project to meet the targets identified.

The application of general energy efficiency measures prior to consideration of LZC energy sources is crucial to meeting the above targets, as it has a multiple effect of reducing running costs, reducing baseline CO_2 emissions and reducing the absolute size of any renewable technologies / financial levies to be applied.

The proposed approach concurs with the GLA Energy Hierarchy:

- **be lean**: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures
- **be clean**: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks
- **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 through the Mayor's post construction monitoring platform.

In line with the above philosophy, the application of low energy lighting and passive improvements to building fabric are proposed.

For residential elements the baseline Carbon Dioxide emissions and LZC energy contribution, on which the %[1] reduction is based, have been calculated using approved SAP 10 software which represents the latest calculation tool as required under The Building Regulations Part L1A 2021.

For non-residential elements (883 sqm industrial floorspace (Use Class E(g)(iii)) and 117sqm of affordable workspace (Use Class E)) the baseline Carbon Dioxide emissions and LZC energy contribution, on which the % reduction is based, have been calculated using approved DSM Level 5 IESVE 2022 software which represents the latest calculation tool as required under The Building Regulations Part L2A 2021. This software is also used for overheating analysis.

[1] The GLA calls for carbon reductions the equivalent of 10% (residential) & 15% (non-residential) over the Part L 2021 building regulations using passive measures only and 35% using renewable technologies as a minimum. 100% savings on residential dwellings are targeted.

Analysis shows that that the development will meet Building Regulations compliance through energy efficient measures alone and then further reductions are achieved through use of air source heat pumps and PV's to beat the 35% improvement target.

Overall the site emissions provide a 73% improvement on combined building regulations L1 & L2 target emissions (for both residential and non-residential buildings).

Further reductions in line with GLA requirements for zero carbon homes will be met by way of cash in lieu payment due to limitations at roof level for the placement of additional photovoltaic cells or other renewable technologies.

Summary of Potential Proposals

Apartments

Heating/Cooling system:	Zeroth district heating network
Domestic Hot Water:	Zeroth district heating network and immersion heater 'boost' facility
Ventilation:	MVHR mechanical supply and extract ventilation with heat recovery.
Passive measures:	Enhanced U-Values to all new build elements
Air tightness:	APR = 3 m^3 / $m^2 \cdot h$ @ 50pa
Lighting:	High efficiency LED and compact fluorescent lighting throughout.
On site LZC technology:	Air Source heat pumps

Townhouses

Heating/Cooling system:	Air source heat pump
Domestic Hot Water:	Air source heat pump and immersion heater 'boost' facility
Ventilation:	MVHR mechanical supply and extract ventilation with heat recovery.
Passive measures:	Enhanced U-Values to all new build elements
Air tightness:	APR = 3 m^3 / m^2·h @ 50pa
Lighting:	High efficiency LED and compact fluorescent lighting throughout.
On site LZC technology:	Air Source Heat Pumps & Photovoltaics

Industrial Units

Heating and cooling system: Heat Pump fed Radiant Panel Heaters with Mechanical Cooling	
Domestic Hot Water:	Hot water by means of air sourced heat pumps
Ventilation:	Mechanical ventilation with heat recovery
Insulation:	Enhanced U-Values to all elements.
Air tightness:	APR = 3.0m^3 / m^2·h @ 50pa.
Lighting:	High efficiency lamps throughout.
On site LZC technology:	Air source heat pumps and Photovoltaics

Summary of Emissions

Standard Assessment procedure (SAP) 10 has been used to demonstrate compliance with Building regulations approved document Part L 2021 and the GLA's current planning policy targets.

Residential – SAP10

Air Source heat pumps and Photovoltaics (PV)

To achieve a minimum 35% reduction over the Target Emission Rate (TER) with enhanced fabric U-Values and infiltration rate, using the SAP 10 Performance method, the residential apartments (blocks A, F & E) will be served by a centralised air source heat pump and condenser water loop connected to individual heat pumps within each apartment providing space heating, hot water generation and tempered cooling. The residential townhouses will be served by standalone air source heat pump systems, to provide space heating and hot water generation.

PV's will be installed on each of the townhouses (blocks C, D & G). The PV panels will be sized and the quantity selected to contribute to the site wide reduction in carbon dioxide emissions. The PV's will be sized to achieve a peak output of approximately 39kW$_e$. The impact on energy savings are highlighted in the table below.

Residential – SAP10

	Carbon dioxide emissions (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	84.1	42.9
After energy demand reduction (Be Lean)	65.6	42.9
After application heat network (Be Clean)	65.6	42.9
After renewable energy (Be Green)	18.2	42.9

Table 1b - Carbon Dioxide Emissions after each stage of the Energy Hierarchy (Residential)

	Regulated carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reductions	18.5	22%
Be clean: saving from heat network	0.0	0%
Be green: saving from renewable energy	47.4	56%
Cumulative on site savings	65.9	78%
Annual savings from offset payment	18.2	-
Tonnes of CO_2		
Cumulative savings for offset payments	546	-
Cash in-lieu contributions (£)	51,826.00	

Table 2b - Regulated carbon dioxide savings from each stage of the Energy Hierarchy (Residential) Carbon price is based on GLA recommended price of £95 per tonne of Carbon Dioxide

Final dwelling emissions rate incorporates energy efficiency, efficient supply of energy and renewable energy technologies. The following SAP analysis demonstrates RIBA stage 2 status and shall not be the final proposal due to design, build ability and cost considerations.

Resistance electric heating and PV's

Resistance electric heating and PV panels are under consideration to be incorporated into the residential energy strategy and further SAP analysis calculations will be carried out to check the viability in the next stages of design development.

Non-Domestic – SAP10

Industrial Units

To achieve a minimum 35% reduction over the TER with enhanced fabric U-Values and infiltration rate, using approved SAP 10 software, the industrial units will be served heat pump fed radiant panel heaters with mechanical cooling, with mechanical ventilation with heat recovery to provide the fresh air requirements to the building. Hot water will be generated by means of air sourced heat pumps. LED lighting will be installed throughout the building. PV panels will be sized and the quantity selected to contribute to the site wide reduction in carbon dioxide emissions. The PV's will be sized to achieve a peak output of approximately 21 kWe. The impact on energy savings are highlighted in the table below.

Non-Domestic – SAP10

	Carbon dioxide emissions (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	3.1	5.6
After energy demand reduction (Be Lean)	2.7	5.6
After application heat network (Be Clean)	2.7	5.6
After renewable energy (Be Green)	0.1	5.6

Table 3b - Carbon Dioxide Emissions after each stage of the Energy Hierarchy (Non-domestic)

	Regulated carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reductions	0.5	15%
Be clean: saving from heat network	0.0	0%
Be green: saving from renewable energy	2.6	82%
Cumulative on site savings	3.0	97%
Annual savings from offset payment	0.1	-
Tonnes of CO_2		
Cumulative savings for offset payments	3	-
Cash in-lieu contributions (£)	258.00	

Table 4b - Regulated carbon dioxide savings from each stage of the Energy Hierarchy (Non-domestic) Carbon price is based on GLA recommended price of £95 per tonne of Carbon Dioxide

Site Wide Emissions - SAP10

	Total regulated emissions (Tonnes CO_2 per annum)	CO2 Savings (Tonnes CO_2 per annum)	Percentage Savings (%)
Baseline: Part L 2021	87.2	-	-
Be Lean	68.3	18.9	22%
Be Clean	68.3	0	0%
Be Green	18.3	50	57%
Total Cumulative Savings		69	79%
Off-set		548.3	-

Table 5b - Totalised Regulated carbon dioxide savings from each stage of the Energy Hierarchy (Site Wide)

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development Total	54.90	26.12	52%

Table 6b - Totalised Fabric energy efficiency (Site Wide)

Introduction

This report provides preliminary proposals for complying with the planning policy set by London Borough of Richmond, London Plan 2021 and the planning requirement for reducing energy consumption below the basic statutory requirement laid down in the Building Regulations Part L1A & L2A 2021.

It is very important for energy efficiency as well as renewable energy to be considered for the development. Buildings that use less energy will therefore need to use a smaller amount of renewable energy to supply the expected proportion of the building's needs.

The reduction in carbon dioxide emissions is quantified as a proportion of baseline carbon emissions for the development (TER). Such reductions take into account energy efficient techniques and technologies such improved insulation, energy efficient lighting etc, before the inclusion of LZC technologies.

All calculations are based on limited planning stage information, for strategy purposes and as such are approximate.

Each LZC technology has been given an evaluation with regard to application to the new development.

Relevant Planning Policy and targets

London Plan 2021

A. Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

1) ***be lean: use less energy and manage demand during operation***
2) ***be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly***
3) ***be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site***
4) ***be seen: monitor, verify and report on energy performance.***

B. Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations 2013 is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

1) ***through a cash in lieu contribution to the borough's carbon offset fund, or***
2) ***off-site provided that an alternative proposal is identified and delivery is certain.***

D. Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

E. Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

F. Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions

London Plan Policy S1 2 (2021)

London Borough of Richmond have confirmed the cash offsetting payment as follows:

A nationally recognised non-traded price of £95/tonne has been tested as part of the viability assessment for the London Plan which boroughs may use to collect offset payments.

London Borough of Richmond

Climate Change Adaption

- *A. The Council will promote and encourage development to be fully resilient to the future impacts of climate change in order to minimise vulnerability of people and property.*
- *B. New development, in their layout, design, construction, materials, landscaping and operation, should minimise the effects of overheating as well as minimise energy consumption in accordance with the following cooling hierarchy:*
    1) *minimise internal heat generation through energy efficient design*
    2) *reduce the amount of heat entering a building in summer through shading, reducing solar reflectance, fenestration, insulation and green roofs and walls*
    3) *manage the heat within the building through exposed internal thermal mass and high ceilings*
    4) *passive ventilation*
    5) *mechanical ventilation*
    6) *active cooling systems (ensuring they are the lowest carbon options).*
- *C. Opportunities to adapt existing buildings, places and spaces to the likely effects of climate change should be maximised and will be supported.*

Policy LP 20

Tackling the climate emergency (Strategic Policy)

- *A. Climate change is now the greatest challenge facing our society. The Council will promote zero carbon development, with the aim that all buildings and infrastructure projects in the borough will be net-zero carbon by 2050. This will require substantial reductions in greenhouse gas emissions and will also reduce fuel poverty and improve long term energy security for Richmond's residents and businesses. Development must not exacerbate climate change. Development should increase local resilience to current and future impacts of climate changes, especially for the most vulnerable people and property.*

- *B. This will be achieved by requiring all development to:*
    1) *reduce greenhouse gas emissions in accordance with the London Plan's Energy Hierarchy and support the transition to a low carbon society by maximising energy efficiency, zero and low carbon heat and local renewable energy generation;*
    2) *follow the principles of the circular economy and support effective resources use to ensure that they are kept in use for as long as possible and thereby minimise waste;*
    3) *reuse and refurbishment in preference to demolition and new construction;*
    4) *demonstrate that they are well designed, fully adaptable and resilient to the impacts of a changing climate;*
    5) *adapt to the changing climate by minimising the effects of overheating, mitigating the urban heat island effect, managing flooding, and minimising energy consumption in accordance with the London Plan's Cooling Hierarchy;*
    6) *enhance and improve the borough's green and blue infrastructure to ensure it delivers multi-functional benefits, such as enhancing micro-climates and natural carbon sinks as well as improving air quality;*

7) ***adopt an integrated approach to water management which considers flood risk, sustainable drainage, water efficiency, water quality and biodiversity;***
8) ***reduce water demand and meet best practice water efficiency targets;***
9) ***adopt a circular economy approach and minimise embodied carbon;***
10) ***ensure that the principles of active and sustainable modes of travel are adopted;***
11) ***promote retrofitting of existing buildings, through low-carbon measures;***
12) ***promote healthy, sustainable and low carbon lifestyles in line with the Council's Climate Emergency Strategy.***

C. ***To ensure that Richmond is on the right trajectory to achieve its net-zero carbon target, responding to climate change, including sustainable design and construction, must be considered holistically from the start of the design process. Therefore, all development proposals are required to demonstrate how they will comply with all relevant policies on climate change and sustainable design during design, construction and operation of the development.***

D. ***The Council will work with partners and local communities to improve the energy efficiency of the existing building stock and wider public realm, with a particular focus on increasing energy efficiency of homes and businesses, especially improved insulation in lofts, walls and floors. The Council's Carbon Offset Fund will be used to implement projects to reduce carbon emissions across the borough.***

Pre-Publication Draft Local Plan Regulation 18 (January 2022)

BASELINE EMISSIONS ASSESSMENT

Dwellings - Regulated Energy

Sample calculations with respect to the energy consumption and carbon emissions relating to the dwellings have been carried out using the Elmhurst Design SAP 10 computer software, which has been tested by the BRE and is approved by the DCLG.

The primary data input to the calculations is given in the appendices.

All SAP calculations are based on the following architect's drawings and Accommodation Schedule.

Architect	Drawing/Document	Description	Revision	Date
Assael	GBT-ASA-ZZ-00-DR-A-0200 GBT-ASA-ZZ-00-DR-A-0201 GBT-ASA-ZZ-00-DR-A-0202 GBT-ASA-ZZ-00-DR-A-0203 GBT-ASA-ZZ-00-DR-A-0204 GBT-ASA-ZZ-00-DR-A-0205	Site Plans – Ground to Roof	-	16/02/22
Assael	GBT-ASA-ZZ-ZZ-DR-A-0450 GBT-ASA-ZZ-ZZ-DR-A-0451 GBT-ASA-ZZ-ZZ-DR-A-0455 GBT-ASA-ZZ-ZZ-DR-A-0454 GBT-ASA-ZZ-ZZ-DR-A-0456 GBT-ASA-ZZ-ZZ-DR-A-0457 GBT-ASA-ZZ-ZZ-DR-A-0458	Industrial site Elevations, Site layouts, sections, and elevations	-	07/02/22
Assael	A2871 Greggs Bakery Site - Industrial Led Scheme WIP Drawing Pack Draft Issue	Details proposed Site layout.	-	07/02/22
Assael	2022-07-13 updated drawing pack and area schedule: GBT-ASA-BB-00-DR-A-0455-R52 GBT-ASA-BB-02-DR-A-0457-R52 GBT-ASA-BB-ZZ-DR-A-0454-R52	Details Updated Site layout. Details Site layouts, sections, and elevations to additional industrial unit.		13/07/2022

PASSIVE Energy Reductions (Hierarchy Level 1 – Be Lean)

The ethos of this project is to ensure that passive measures are adopted prior to the application of high efficiency or renewable technologies wherever feasible. This approach is in accordance with the London Plan (2021). The measures that have been included in the baseline emissions model are summarised below. All measures are quantified within the BER and DER/BER figures:

- Thermal Insulation;
- Air tightness;
- Maximised daylighting;
- Passive solar gain.

Building Fabric

The investment in thermal insulation to heated spaces will result in an improvement in heat losses and hence reduction in annual heating fuel consumption. All windows are based on aluminium frames.

Minimum Building constructions required to meet Building Regulations Part L 2021:

Building Element	U-Value
External Wall	0.26 W/m^{2}K
Roof	0.16 W/m^{2}K
Ground Floor	0.18 W/m^{2}K
Windows	1.6 W/m^{2}K

Proposed improved Building Constructions to exceed Building Regulations Part L 2021:

Building Element	U-Value
External Wall	0.15 W/m^{2}K
Roof	0.15 W/m^{2}K
Ground Floor	0.12 W/m^{2}K
Windows	1.3 W/m^{2}K G-value 0.4

All party walls are taken as U-value = 0 which requires a fully filled and sealed wall with no cavities. **It is important that the architect's details reflect this.**

The U-Values proposed above are indicative and are subject to change, due to the limited information available when carrying out the SAP calculations and preparing this report.

Infiltration and air tightness

To achieve the required result the buildings should be designed to achieve an air permeability of 3 m^3/h/m^2 at 50Pa.

Efficient Energy Delivery (Hierarchy Level 2 – Be Clean)

Existing District Heating

According to the London Heat Map, unfortunately there are no existing local district heat networks in operation, therefore there is no current opportunity to connect the site to a district heat network. The map is highlighted in appendix A.

Site based District Heating

The London Plan and London Borough of Richmond strongly encourage district heating. The scale of the development permits a district heating strategy to be considered. Although serving the townhouses and industrial units from a central plant location at the north end of the site, within the central apartment block building, the pipework lengths required to serve all the townhouses and industrial units will be extensive and will lead to high heat loses. Therefore, the proposal is to only serve the apartment blocks with a centralised heating system.

The centralised plant will be made up of air source heat pumps, a dry cooler and a circulated condenser water loop distributed to all the apartments.

Key elements of centralised heating system:

- 2No. 240kW Air Source heat pumps,
- 1No. dry air cooler;
- 3m3 Buffer vessel;
- Heating Pressurisation Unit and Expansion Vessel;
- Low Loss Header;
- Circulating Pumps;
- Reverse cycle heat pump units in each dwelling with hot water cylinder;
- Control Panels;
- Chemical Dosing Pot;
- Louvres for Natural Ventilation to the Plantroom;
- Ancillary plant;
- Allocation for one set of double doors and separate escape door;
- Capped off connections for future external district heat distribution networks.

The on-site energy centre will be designed to circulate condenser water from the air source heat pumps and or dry air coolers to the apartments. The external plant will operate to maintain the condenser water at temperatures between 15°C - 25°C to serve as a heat sink for the reverse cycle heat pumps in the residential apartments. The centralised air source heat pump will operate when the external ambient temperature is below 15°C or above 25°C, the dry cooler will operate during the mid-band external ambient temperatures.

The tenants will utilise energy from the condenser water via the reverse cycle heat pumps installed in each apartment, energy usage will sub metered at the interface point.

It is envisaged that the landlord or an external metering and billing Company will be responsible for all metering and revenue collection.

From initial plant sizing and planning, the external plant will require a space allocation at roof level of approximately 14mL x 4.5mW x 3.0mH, which has been allowed for on block F. The internal plant area housing the circulation pumps, buffer vessel, pressurisation unit, dosing plant, controls and connections to future district heating networks will be located at ground floor level of the central apartment block.

The mains condenser water pipe work connecting the central heat generation plant to each apartment would be owned and operated by the residential landlord / managing agent.

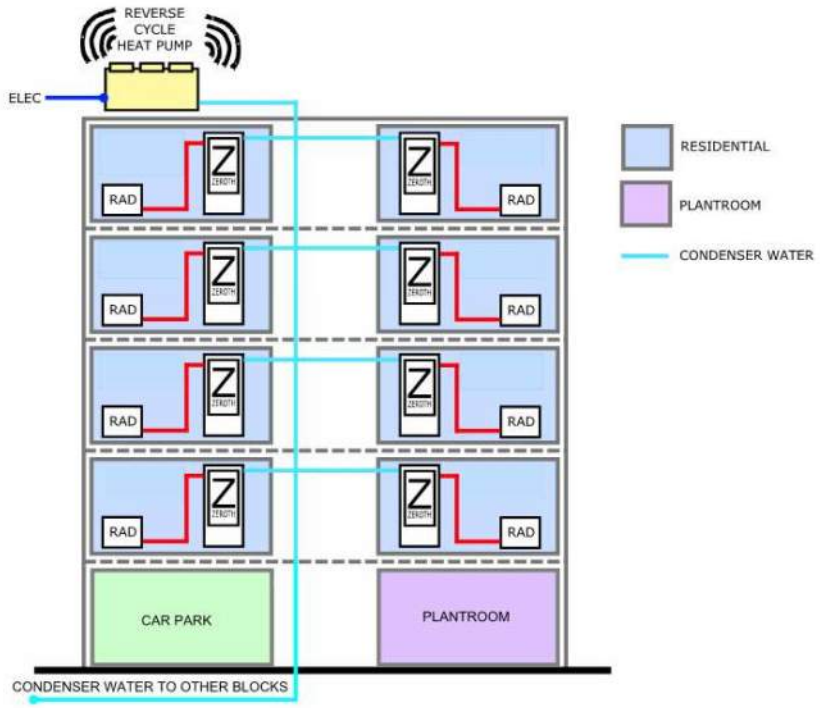


Figure 1 - Flat District Heating Philosophy

Apartment Internals

The heating system within each apartment will be ostensibly the same as a conventional system. The only obvious difference will be the way in which heat energy is delivered into the apartment. In a conventional system a gas fired boiler generates the heat that is delivered to the radiators and taps through low temperature hot water (LTHW) and domestic hot water (DHW) respectively. Metered gas is piped to the apartment. In the proposed system the boiler is replaced with an electric reverse cycle heat pump, which takes the heat out of the condenser water loop, which is maintained between 15oC and 25oC by the central plant, and further increases the temperature of the water up to 60oC and delivers it to the radiators and taps, via the hot water cylinder. No gas supply is required. Within each apartment the heat pump and hot water cylinder are installed within an internal cupboard.

Figure 2 – A heat pump and hot water cylinder within an apartment utility cupboard

Overheating Issues

There is a general consensus that site wide district heating can cause problems with overheating and thus energy inefficiencies across the development. Utilising lower water temperatures as proposed for the condenser water loop. The risk of overheating in corridors, caused by heat loss from distribution pipework is eliminated and energy inefficiencies across the development are minimised. The heat pump also has the facility to provide tempered cooling in the dwellings via fan assisted radiators to minimise the risk of overheating.

Billing Arrangements

The energy usage by each apartment is monitored by means of a heat meter which may be installed within the heat pump unit or within a meter cupboard located within the common area. This heat meter can be read directly by the managing agent or can be read remotely through either a connection to a data cable network system wired to a central monitoring point or by means of a wireless transmitter (Bluetooth). With the Bluetooth transmitter the meter can be read from outside the apartment by someone with a hand held receiver loaded with dedicated secure monitoring software. The overall cost of providing the heat is then apportioned to the occupiers by the managing agent based upon the heat meter readings.

Centralised Air Sourced heat pumps & individual revers cycle heat pumps.	
Advantages	**Disadvantages**
Carbon savings are still good with current carbon emission factors for electricity.	Higher site wide electrical consumption could lead to additional substations and infrastructure reinforcement costs.
Carbon savings are predicted to increase when revised carbon factors are incorporated.	More roof space required (if ASHPs are utilised to maintain the condenser loop temperatures).
Renewable Heat Incentive available.	Landlord ASHP Plant can be noisy.
Low impact on air quality.	Large Utility Cupboards
Electricity generated on site.	Increased Maintenance requirements.
Predicted reduction in Landlord's plantroom requirements.	Lower life expectancy for Heat Pumps (10/15 years)
Capital Costs predicted to be lower	Auto de-frost function takes units off line for periods.
Limited distribution losses and negligible risk of overheating in corridors.	Controls need to be carefully considered as the Zeroth unit cannot offer simultaneous heating / cooling / DHW recharge.
Main energy billing to be electricity, therefore tenant can change provider.	Condenser Water pipework is predicted to be larger than district heating pipework due to the lower ΔT and diversity.
Less metering requirements.	Noise from the unit is currently an unknown. May need a higher spec of doors etc.
Immersion heater will act as a back-up for domestic hot water if the main plant fails.	Radiators would be oversized due to lower water temperatures.
2no. District Condenser Water pipes required rather than the 4no. pipes for options 2A and 2B.	

Table 1 - Advantages and Disadvantages of Air Source heat pumps combined with individual heat pumps.

Individual air source heat pump systems - Town houses

Air source heat pumps are proposed to be installed to each of the townhouses to provide both heating and tempered cooling, and hot water generation. The indoor unit will connect to fan assisted radiators, which provide sufficient output to offset the heat loses, with lower operating temperatures than traditional radiators. Air source heat pump systems operate most efficiently when coupled with low temperature heating systems. Therefore to maximise coefficients of performance such systems are typically adopted.

Each system can be stand alone and therefore all financial benefits associated with the system efficiencies will be passed on to the building occupier.

Such a system would typically comprise:

- An external air cooled condenser
- A Wall hung or floor mounted unit (internally mounted), commonly called a hydrobox.
- Refrigerant pipework connecting the condenser and hydrobox
- Hot water cylinder fed from the hydrobox, using LTHW pipework, typically installed in copper.
- Fan assisted radiators.
- Local control via a central time clock, and adjustable thermostats in each room.

The outdoor condenser unit shall be installed within an acoustic enclosure, on a raised flat concrete base, to allow condense water to drain away.

Fan assisted radiator

Condenser in an acoustic enclosure

The exact location and size of the ASHP outdoor units is subject to final unit selection and manufacturer however the rear gardens have been identified as the most suitable location.

Lighting and Metering

In the apartment blocks, lighting within the communal areas will be by means of wall and ceiling mounted compact fluorescent luminaires located within the stair cores and surface and recessed compact fluorescent luminaries within the corridors and foyer. The lighting levels will be designed to the Society of Light and Lighting (SLL) code for lighting. Automatic lighting control will be provided to minimise energy consumption.

System lighting to the all dwellings will be provided by means of a mixture of low energy down lights, low energy ceiling roses and low energy down lights, such that 100% of lighting shall be by low energy fittings.

Each apartment will have individual electricity metering from an appointed meter shipper which will be sited in the main riser cupboards at each block/floor level or in house meter cupboards. The Landlords areas will be separately metered and the cost of the energy used apportioned across the block by service charge.

The townhouses will be individually served with new supplies terminated near to the front elevation of each house, where electricity meter will be installed in line with the local DNO's requirements.

Mechanical Ventilation with Heat Recovery (MVHR)

All houses and apartments shall have a mechanical ventilation system with heat recovery captures heat energy from the outgoing air extracted from kitchens and bathrooms within the home and warms the fresh air being blown into the home. Heat recovery on the background ventilation further reduces heat loss complementing the improvements in the building fabric. The heat exchanger shall be bypassed during the summer months to ensure that the general background ventilation provided through the MVHR assists in cooling the homes.

Heating and Cooling – Shell and Core Industrial Units

The shell and core industrial space will be provided with capped off incoming services. The units will be individually served by Daikin Altherma 3 Air Source Heat pumps, feeding radiant panel heaters to provide space heating. Such systems are electrically driven and utilise very good coefficient of performance to minimise running costs and CO2 emissions. The size and nature of the industrial units are well suited to this type of system and it is anticipated that proposed tenants would expect to install such a system as part of their fit out if required.

Summary

The energy efficient measures that have been included in the baseline emissions model are summarised below.

- Centralised air source heat pumps combined with reverse cycle heat pumps in each of the apartments;
- Individual air source heat pumps serving the townhouses
- High efficiency mechanical ventilation with heat recovery;
- High efficiency lighting;
- Sub-metering to mechanical plant;
- Time-clock and temperature zone control of heating;
- Weather compensated control of heating.

The key efficiency data proposed is:

	Residential
Lighting	High efficiency
Heating seasonal efficiency	0.96
Cooling seasonal efficiency	N/A
Ventilation SFP	0.4
Ventilation heat recovery	91%
HWS efficiency	97% of LTHW

	Industrial
Lighting	High efficiency
Heating seasonal efficiency	3.56
Cooling seasonal efficiency	2.69
Ventilation SFP	1.9
Ventilation heat recovery	86%
HWS efficiency	Same as Space Heating

LZC Energy Feasibility (Hierarchy Level 3 - Be Green)

LZC Energy Type	Application	Feasibility
Wind Turbine Power	Roof mounted small scale wind turbines for domestic and non domestic buildings. Wind speeds of 7m/s or above required for large scale therefore high level mounting only option.	Visual electromagnetic and environmental noise impact, and public opposition to such, may have negative effect on planning process. Electricity metering for domestic properties and responsibility for maintenance reduce the feasibility for this to be applied to residential. Vibration isolation required for building mounted turbines. Noise may affect natural ventilation feasibility for domestic properties. Wind study required to ensure conditions are correct. Feasibility for large scale not possible due to urban location. Appearance of turbines problematic. Low wind speeds at location increases number of turbines required.
Photovoltaics	PV panels integrated into building fabric, such as cladding, roof surface or brise soleil. Elevations south-east to south-west unshaded.	PV panels can be prone to vandalism in certain locations. Simple systems requiring little maintenance other than cleaning and repair. Individual connection to each dwelling required to permit maximum utilisation and FIT entitlement. Appearance can be unappealing where visible, however tile integrated PVs are less obtrusive. South facing roof space limited.
Ground Source Heating	Can be utilised individual systems with central or individual ground loop operation. Particularly suited to underfloor heating. Can preclude the need for gas distribution to individual properties.	Very costly More suited to individual systems, additional heating can be required to domestic hot water as typical temperatures are only 50°C.
Ground Source Heating		Borehole requirements and ground conditions may reduce the amount that could be implemented. Environment Agency Licence may be required.

LZC Energy Type	Application	Feasibility
River Source Heating	Can be utilised individual systems with central or individual operation.	Available source adjacent to site. Limited volume flow rate in river, therefore limited capacity. Environment Agency Licence would be required. Canal and River Trust licence required.
Air Source Heat Pumps	Particularly suited to water based heating and cooling systems. Particularly suited to underfloor heating or fan assisted radiators. Precludes the need for gas distribution to individual properties.	Roof or external compound space required. Outdoor units can be unsightly and generate background noise. Conventional heating and cooling delivery plant can still be utilised. Medium capital cost. Sufficient power supply required. Good maintenance support.
Solar Hot Water	Roof mounted solar collectors combined with local hot water calorifiers. Gas or electric back up system still required. Solar hot water is not a replacement of such systems.	Roof space availability for solar collectors subject to planning acceptance relating to visual appearance and height. Suitable for domestic and commercial properties. Limited load utilisation – difficult to achieve large saving. Oversized calorifier space required in each flat. Limited south facing roof space.
Biomass Heating	Central boiler installation for whole block. Wood chips used as primary fuel. Provides space heating and domestic hot water for whole site, or could be limited to residential only.	The necessary transportation of wood chips to site and ash from site using road reduces the carbon emission savings available. The proximity of wood chip sources and congested roads adds to the disadvantage. Wood chip and ash storage on site required. Very little space available for this. Back up gas installation required to ensure heat supply in the event of reliability problems or fuel availability problems. Only compatible with centralised systems.

LZC Energy Type	Application	Feasibility
Biomass CHP	CHP – Combined Heat and Power Adopts same principles as Biomass Heating, however part of the central plant will be utilised to provide power generation for the site and distribution back to the national Grid. Applicable to a commercial trigeneration system when used in conjunction with Biomass Fuel.	Feasibility issues as described above remain. CHP reduces the overall site carbon emissions due to very good efficiencies, therefore reducing the overall amount of renewable energy sources required for the site. Constant year round base load required to ensure generated heat is utilised. Does not suit proposed low operating temperatures.
Natural gas CHP	CHP – Combined Heat and Power Heat source for district heating system. Electrical output for landlord use or export.	Requires district heating for full load utilisation and maximisation of diversified heat load. CHP reduces the overall site carbon emissions due to very good efficiencies. No gas to site proposed. Does not suit proposed low operating temperatures.
Natural gas CHP	CHP – Combined Heat and Power Micro CHP to each dwelling	Complex domestic machinery requires intensive maintenance. No external plant space required Low electrical output reduces carbon efficiency compared to centralised CHP. New gas supply through existing building required – impractical.

Feasibility Matrix

1 = poor
5 = excellent

Site suitability rating doubled to provide weighting

Where site application is less than 6 this option must be ruled out due to impracticalities.

Technology	Cost	Internal Plant Space	Roof space	Suitability of Site Application	Total
Turbines (Tower)	1	4	5	2	**12**
Turbines (Roof Mounted)	3	4	2	4	**13**
Photovoltaics	3	5	4	10	**22**
Solar Hot Water	4	1	1	10	**16**
Ground Source Heat Pumps	1	2	5	4	**12**
Air Source Heat Pumps	4	4	2	10	**20**
Centralised CHP	2	2	5	5	**14**
Biomass Boiler	2	2	5	5	**14**
Decentralised CHP	2	2	5	4	**13**

Energy Monitoring (Hierarchy Level 4 - Be Seen)

The London Plan introduces a fourth stage to the energy hierarchy; the Be Seen stage, which proposes monitoring and reporting of the actual operational energy performance of major developments for at least five years.

An effectively implemented post-construction monitoring regime can have several benefits including environmental (e.g. reduced grid infrastructure strain, carbon emissions reduction) and socio-economic (e.g. reduced occupants bills and raised awareness around energy use).

The Be Seen stage aims to monitor that the actual energy and carbon performance of buildings is aligned with the estimate figures. This is expected to assist with achieving a zero-carbon London.

Standard monitoring of the Energy Centre and heat network will be undertaken during operation and It is expected that the following will be metered:

- Electricity, and water used in the Energy Centre;
- Heat leaving the Energy Centre;
- Heat entering each block;
- Final customer heat consumption.

The metering and controls strategy will be further developed during the detailed design process.

ENERGY ASSESSMENT

Low or Zero carbon Energy Assessment

The incorporation of 2No. 240kW air source heat pumps in combination with the individual reverse cycle heat pumps form the district heating system to serve the 65 apartments. Individual air source heat pump systems will serve the townhouses and will contribute to meeting in excess of the 35% reduction on the building regulations L1 target emissions.

Renewable Energy Assessment

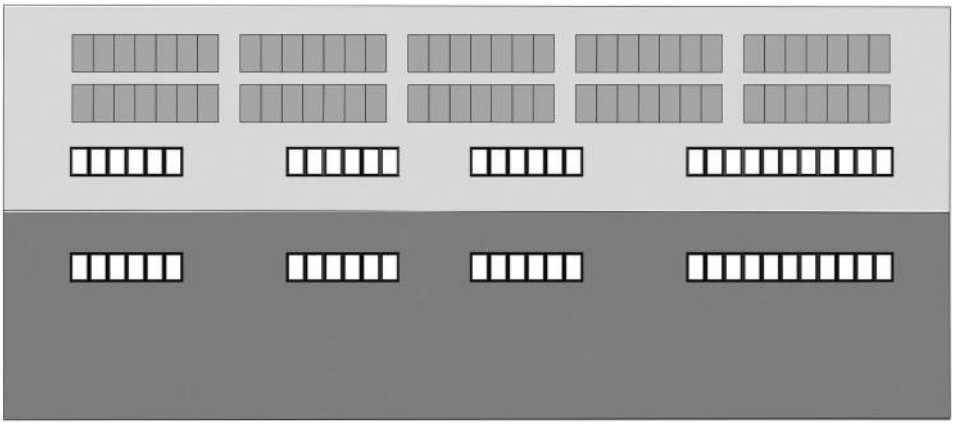
PV cells will be provided to the townhouses and industrial units contributing to a minimum site wide reduction in carbon dioxide emissions of 35%.

Tile PV panels are specified to provide the required kWh/year output to achieve the energy target for the site.

SAP Assessments and PV design has led to the following provision:

Where roof space allows an array of 330W Mono Black panels are proposed on the roofs of all the townhouses, providing 35kW peak in total.

On the industrial units, 70 panels have been assigned, providing 21kW peak in total



Industrial Units PV Array

Summary of Emissions

To achieve a minimum 35% reduction over the TER with enhanced fabric U-Values and infiltration rate, Air source heat pumps will cater for the heating and hot water demand across the site. PV's will need to be sized for the townhouses to achieve a peak output of approximately 35kW$_e$. The impact on energy savings are highlighted in the table below.

When calculating the site wide carbon emissions, a provision of circa 21kW$_e$ peak output from PV panels was applied to each industrial units.

Residential – SAP10

	Carbon dioxide emissions (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	84.1	42.9
After energy demand reduction (Be Lean)	65.6	42.9
After application heat network (Be Clean)	65.6	42.9
After renewable energy (Be Green)	18.2	42.9

Table 1b - Carbon Dioxide Emissions after each stage of the Energy Hierarchy (Residential)

	Regulated carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reductions	18.5	22%
Be clean: saving from heat network	0.0	0%
Be green: saving from renewable energy	47.4	56%
Cumulative on site savings	65.9	78%
Annual savings from offset payment	18.2	-
Tonnes of CO_2		
Cumulative savings for offset payments	546	-
Cash in-lieu contributions (£)	51,826.00	

Table 2b - Regulated carbon dioxide savings from each stage of the Energy Hierarchy (Residential) Carbon price is based on GLA recommended price of £95 per tonne of Carbon Dioxide

Final dwelling emissions rate incorporates energy efficiency, efficient supply of energy and renewable energy technologies. The following SAP analysis demonstrates RIBA stage 2 status and shall not be the final proposal due to design, buildability and cost considerations.

Industrial Units

Non-Domestic – SAP10

	Carbon dioxide emissions (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	3.1	5.6
After energy demand reduction (Be Lean)	2.7	5.6
After application heat network (Be Clean)	2.7	5.6
After renewable energy (Be Green)	0.1	5.6

Table 3b - Carbon Dioxide Emissions after each stage of the Energy Hierarchy (Non-domestic)

	Regulated carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reductions	0.5	15%
Be clean: saving from heat network	0.0	0%
Be green: saving from renewable energy	2.6	82%
Cumulative on site savings	3.0	97%
Annual savings from offset payment	0.1	-
Tonnes of CO_2		
Cumulative savings for offset payments	3	-
Cash in-lieu contributions (£)	258.00	

Table 4b - Regulated carbon dioxide savings from each stage of the Energy Hierarchy (Non-domestic) Carbon price is based on GLA recommended price of £95 per tonne of Carbon Dioxide

Site Wide Emissions

SAP10

	Total regulated emissions (Tonnes CO_2 per annum)	CO2 Savings (Tonnes CO_2 per annum)	Percentage Savings (%)
Baseline: Part L 2021	87.2	-	-
Be Lean	68.3	18.9	22%
Be Clean	68.3	0	0%
Be Green	18.3	50	57%
Total Cumulative Savings		69	79%
Off-set		548.3	-

Table 5b - Totalised Regulated carbon dioxide savings from each stage of the Energy Hierarchy (Site Wide)

	Target Fabric Energy Efficiency (kWh/m^2)	Dwelling Fabric Energy Efficiency (kWh/m^2)	Improvement (%)
Development Total	54.90	26.12	52%

Table 6b - Totalised Fabric energy efficiency (Site Wide)

Final dwelling emissions rate incorporates energy efficiency, efficient supply of energy and renewable energy technologies. The SAP analysis demonstrates RIBA stage 2 status and shall not be the final proposal due to design, build ability and cost considerations.

Cash In lieu Carbon Payment

To meet the zero carbon target for the **site wide development** element of the development a cash in lieu payment can be made, as quoted below:

London Plan 2021

Boroughs should develop a price for offsetting carbon using either a nationally recognised carbon pricing mechanism or a price based on the cost of offsetting carbon across the borough. A nationally recognised non-traded price of £95/tonne has been tested as part of the viability assessment for the London Plan which boroughs may use to collect offset payments.

London Borough of Richmond recognise £95/tonne carbon offset payment.

Based upon the planning stage energy strategy calculations a carbon dioxide shortfall of 549 tonnes over 30 years is estimated (see Carbon Emissions table above), and this will therefore result in a carbon offsetting cash payment in the order of **£52,084.00**

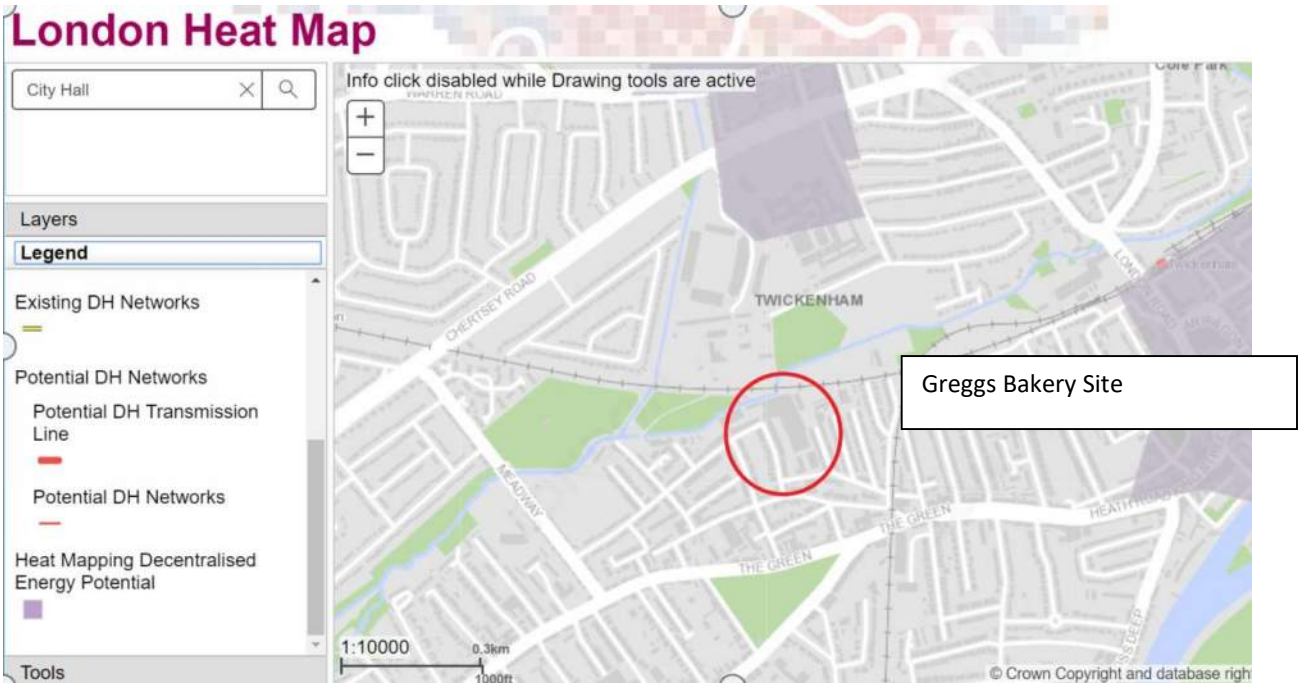
The above calculations are based on pre planning stage 2 apartment layouts and are therefore estimates. Figures will need to be refined as the design progresses and when final design stage SAP calculations are submitted during RIBA design stage 4.

Appendix A – Local heat networks

The extract below shows the current heat map for the surrounding area as accessed from https://maps.london.gov.uk/heatmap/

The grey shaded areas shows identified decentralised heat potential.

There are currently no local heat networks within the area surrounding the site.



Appendix B – SAP Analysis BE LEAN

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:21

Project Information			
Assessed By	Keith Ketchley	Building Type	Flat, Detached
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	72 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-A-2B4P-Be Lean
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Mains gas	
Target carbon dioxide emission rate	*10.36 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	7.89 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*54.2 kWh_{PE}/m^2*	
Dwelling primary energy	42.66 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*23.5 kWh/m^2*	
Dwelling fabric energy efficiency	20.4 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	N/A	N/A	**N/A**
Roofs	*0.16*	N/A	N/A	**N/A**
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	29.7	0.15

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	2.5	East	0.8	1.3
Opening, Opening Type 2	2.5	East	0.8	1.3
Patio Door, Opening Type 2	5.6	East	0.8	1.3
Opening, Opening Type 2	3.6	West	0.8	1.3
Front Door, Opening Type 1	2	North	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E7: Party floor between dwellings (in blocks of flats)	Government-approved scheme	0 **(!)**	
External wall	E16: Corner (normal)	Government-approved scheme	0 **(!)**	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Boiler with radiators or underfloor heating - Mains gas	
Efficiency	89.1%
Emitter type	Radiators
Flow temperature	35°C
System type	Notional
Manufacturer	Notional
Model	Notional
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: Instantaneous	
Efficiency	0.0%
Manufacturer	Hei-tech b.v.
Model	Recoh-vert RV3

6 Controls	
Main heating 1 - type: Programmer, room thermostat, and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	1.47 kWp
Orientation	South East
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks

N/A

11 Supporting documentary evidence

N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-A-2B4P-Be Lean	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	93 A	**DER**	7.89	**TER**	10.36
Environmental	94 A	**% DER < TER**			23.84
CO_2 Emissions (t/year)	0.53	**DFEE**	20.40	**TFEE**	23.45
Compliance Check	See BREL	**% DFEE < TFEE**			13.00
% DPER < TPER	21.30	**DPER**	42.66	**TPER**	54.20

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Northeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	27.00 m	72.00 m²	2.50 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	25.00	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	45.90	29.70	0.00	None	16.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	43.22

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)

Party Ceiling 1	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Solid Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	East	2.50	0
Opening	Opening Type 2	External Wall 1	East	2.50	0
Patio Door	Opening Type 2	External Wall 1	East	5.60	0
Opening	Opening Type 2	External Wall 1	West	3.60	0
Front Door	Opening Type 1	External Wall 1	North	2.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E7 Party floor between dwellings (in blocks of flats)	Gov Approved Scheme	27.00	0.00	0.00	Yes
E16 Corner (normal)	Gov Approved Scheme	10.00	0.00	0.00	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

Summary for Input Data

24.0 Main Heating 1	Manufacturer	
Description	Notional	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	104	
In Winter	89.10	
In Summer	89.10	
Model Name	Notional	
Manufacturer	Notional	
System Type	Notional	
Controls SAP Code	2106	
Delayed Start Stat	Yes	
Burner Control	Modulating	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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	Yes	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Summer Immersion	No	
Cold Water Source	From mains	
Bath Count	1	
Supplementary Immersion	No	

Summary for Input Data

Immersion Only Heating Hot Water	No	

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

Instantaneous System 1

Database ID	80003	
Brand Model	Showersave, Recoh-vert RV3	
Details	Year: 2011 + 2017 Efficiency: 0 Utilisation factor: 0.974	

29.0 Hot Water Cylinder	None	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
1.47	South East	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

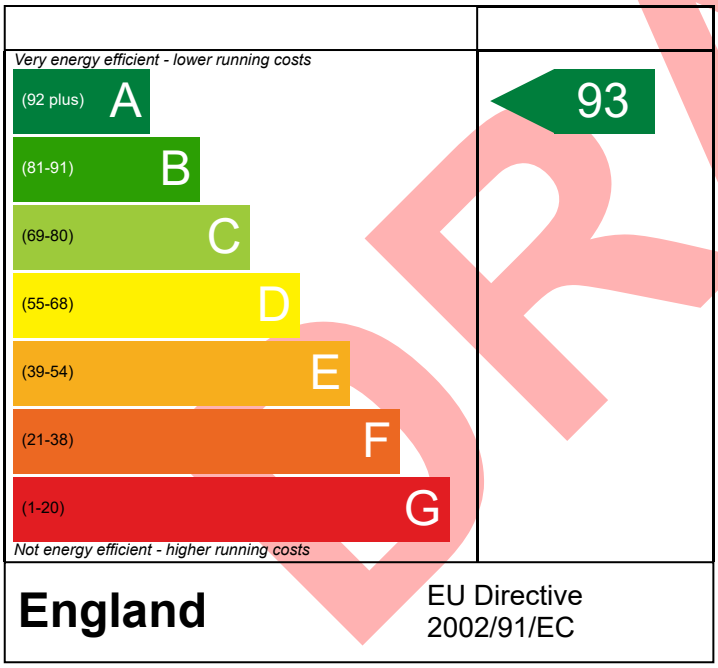
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	Flat, Detached
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	72 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

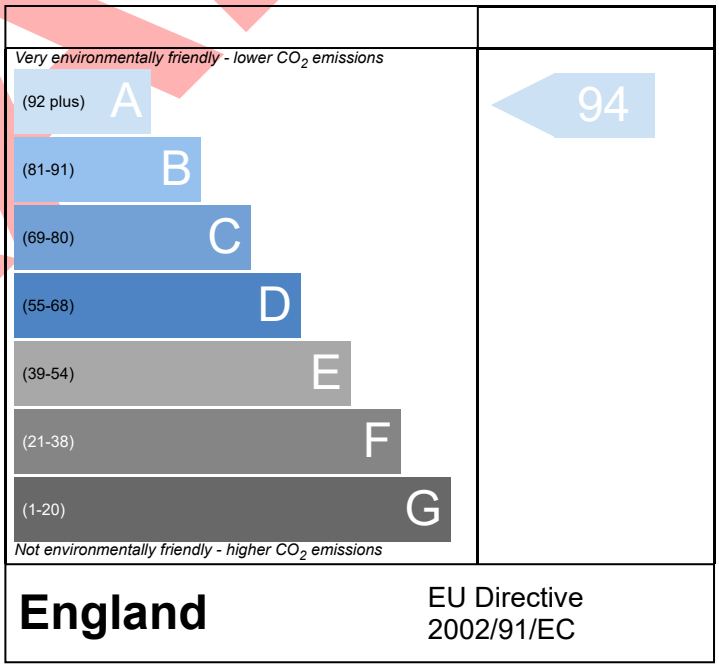
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

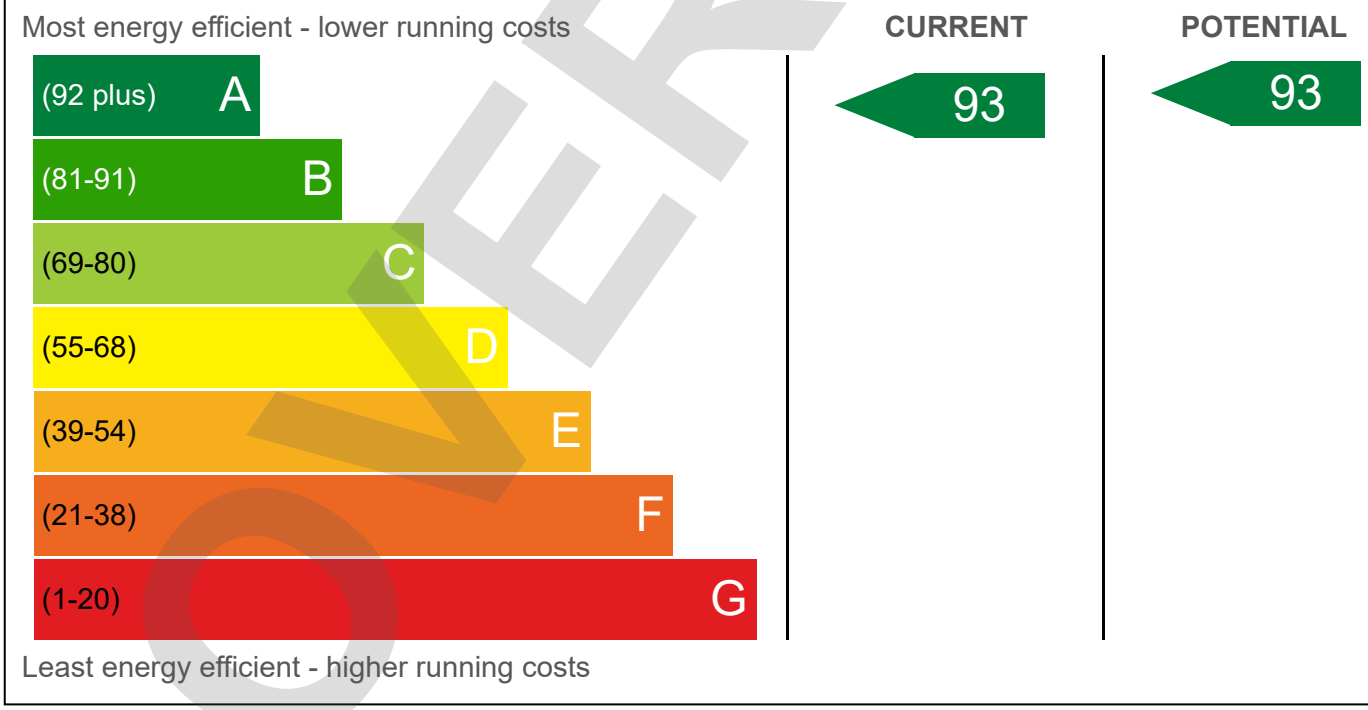
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Detached
Floor Area [m^2]	72

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 40 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.5** per year

With the recommended measures the potential CO emissions could be: **1** per year

Recommendations

Overview Report

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£132

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Overview Report

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:21

Project Information			
Assessed By	Keith Ketchley	Building Type	House, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	126 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-C-TH-Be Lean
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Mains gas	
Target carbon dioxide emission rate	*8.44 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	7.52 kgCO_2/m^2	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*43.86 kWh$_{PE}$/m^2*	
Dwelling primary energy	40.64 kWh$_{PE}$/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*27.4 kWh/m^2*	
Dwelling fabric energy efficiency	31.6 kWh/m^2	FAIL

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	OK
Roofs	*0.16*	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	25.53	0.15
Party wall: Party Wall (1)	188.5	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	42.04	0.12
Exposed roof: Roof (1)	24.1	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	14.89	West	0.8	1.3
Opening, Opening Type 2	7.9	East	0.8	1.3
Door, Opening Type 1	2.53	East	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	SAP table default	0.32	
External wall	E6: Intermediate floor within a dwelling	SAP table default	0.14	
External wall	E18: Party wall between dwellings	SAP table default	0.24	
Party wall	P3: Intermediate floor between	SAP table default	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
	dwellings (in blocks of flats)			
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 **(!)**	
Party wall	P5: Roof (insulation at rafter level)	SAP table default	0.48	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Boiler with radiators or underfloor heating - Mains gas	
Efficiency	89.1%
Emitter type	Radiators
Flow temperature	45°C
System type	Notional Spec
Manufacturer	Notional Spec
Model	Notional Spec
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: Instantaneous	
Efficiency	0.0%
Manufacturer	Hei-tech b.v.
Model	Recoh-vert RV3

6 Controls	
Main heating 1 - type: Programmer, room thermostat, and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	2.52 kWp
Orientation	South East
Pitch	30°
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-C-TH-Be Lean	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	94 A	**DER**	7.52	**TER**	8.44
Environmental	93 A	**% DER < TER**			10.90
CO_2 Emissions (t/year)	0.79	**DFEE**	31.60	**TFEE**	27.37
Compliance Check	See BREL	**% DFEE < TFEE**			-15.47
% DPER < TPER	7.34	**DPER**	40.64	**TPER**	43.86

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Unknown	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	23.87 m	41.00 m²	2.50 m
1st Storey:	23.87 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	20.50	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	25.53	0.00	None	25.32	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	188.50	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.11	9.00	24.10	0.00	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	+1	Plasterboard ceiling, carpeted chipboard floor	40.80

Summary for Input Data

elmhurst energy

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	42.04

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	West	14.89	0
Opening	Opening Type 2	External Wall 1	East	7.90	0
Door	Opening Type 1	External Wall 1	East	2.53	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Table K1 - Default	8.59	0.32	0.32	Yes
E6 Intermediate floor within a dwelling	Table K1 - Default	25.40	0.14	0.14	Yes
E18 Party wall between dwellings	Table K1 - Default	30.00	0.24	0.24	Yes
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	19.20	0.00	0.00	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	33.00	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)	Table K1 - Default	12.60	0.48	0.48	No

Y-value	0.17	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Manufacturer

Summary for Input Data

Description	Notional Spec	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	104	
In Winter	89.10	
In Summer	89.10	
Model Name	Notional Spec	
Manufacturer	Notional Spec	
System Type	Notional Spec	
Controls SAP Code	2106	
Delayed Start Stat	Yes	
Burner Control	Modulating	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	45.00	
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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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	Yes
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

Summary for Input Data

elmhurst energy

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

Instantaneous System 1

Database ID	80003	
Brand Model	Showersave, Recoh-vert RV3	
Details	Year: 2011 + 2017 Efficiency: 0 Utilisation factor: 0.974	

29.0 Hot Water Cylinder	None	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	

31.0 Thermal Store	None	

32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
2.52	South East	30°	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	House, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	126 m²
DRRN:	

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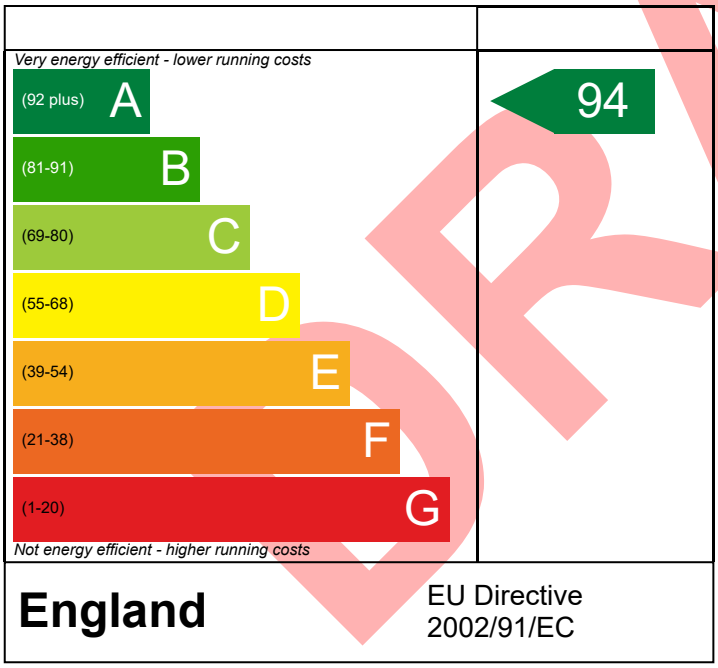
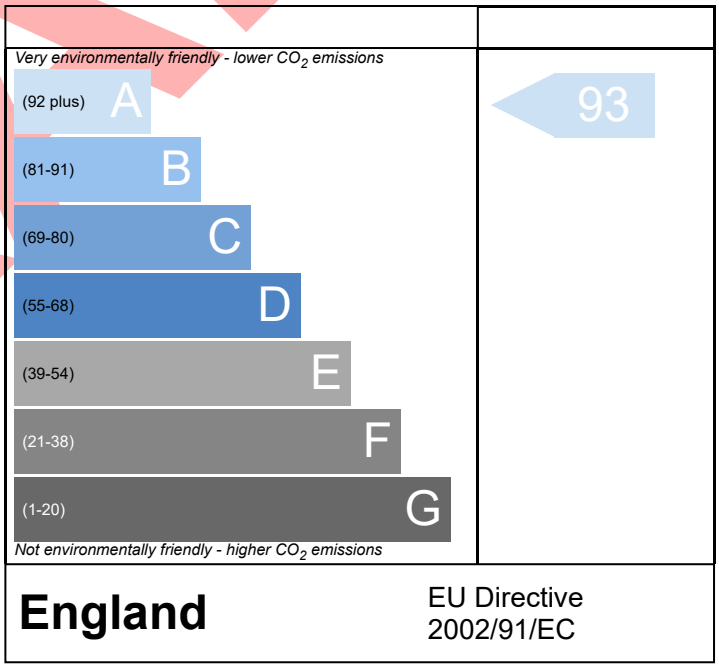
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

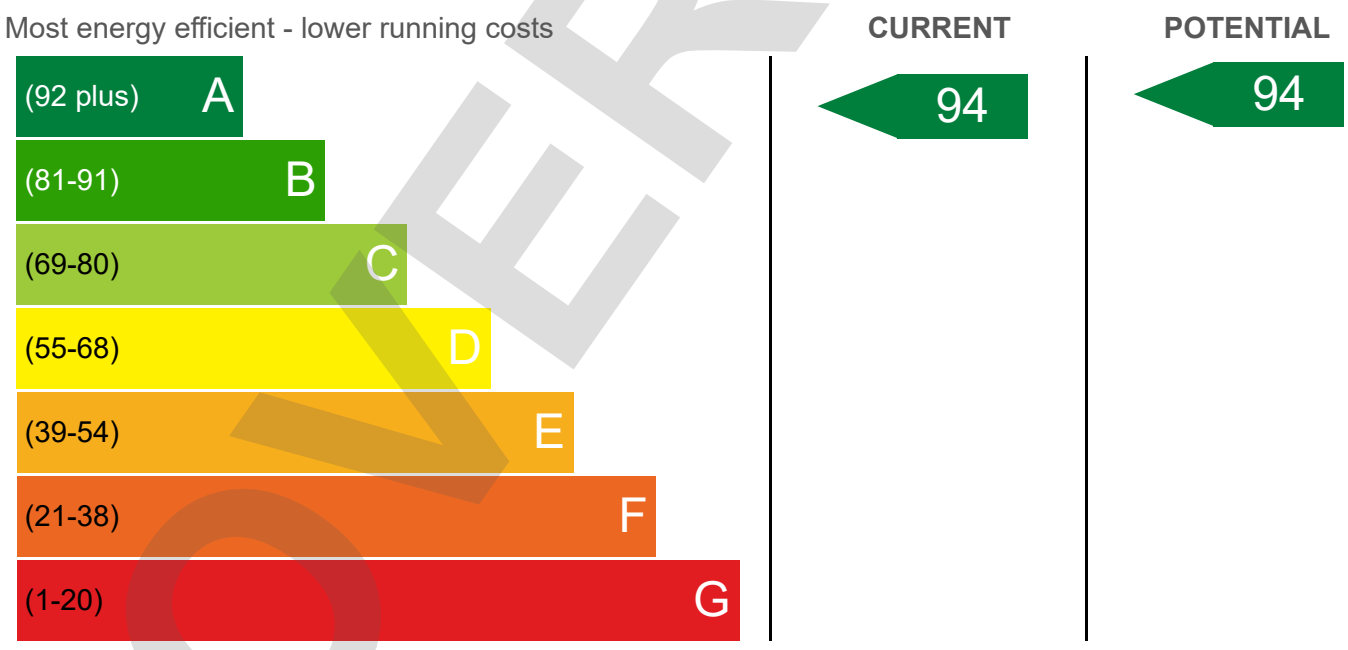
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m^2]	126

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 34 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.8** per year

Overview Report

With the recommended measures the potential CO emissions could be: 1 per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£129

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:19

Project Information			
Assessed By	Keith Ketchley	Building Type	House, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	126 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-D-TH-Be Lean
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Mains gas	
Target carbon dioxide emission rate	*8.7 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	8.64 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*45.26 kWh_{PE}/m^2*	
Dwelling primary energy	46.98 kWh_{PE}/m^2	FAIL
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*29.0 kWh/m^2*	
Dwelling fabric energy efficiency	32.9 kWh/m^2	FAIL

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	OK
Roofs	*0.16*	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	25.53	0.15
Party wall: Party Wall (1)	55.65	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	31	0.12
Exposed roof: Roof (1)	70.6	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	14.89	West	0.8	1.3
Opening, Opening Type 2	7.9	East	0.8	1.3
Door, Opening Type 1	2.53	East	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	SAP table default	0.32	
External wall	E6: Intermediate floor within a dwelling	SAP table default	0.14	
External wall	E18: Party wall between dwellings	SAP table default	0.24	
Party wall	P3: Intermediate floor between	SAP table default	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
	dwellings (in blocks of flats)			
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 **(!)**	
Party wall	P5: Roof (insulation at rafter level)	SAP table default	0.48	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Boiler with radiators or underfloor heating - Mains gas	
Efficiency	89.1%
Emitter type	Radiators
Flow temperature	35°C
System type	Notional
Manufacturer	Notional
Model	Notional
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: Instantaneous	
Efficiency	0.0%
Manufacturer	Hei-tech b.v.
Model	Recoh-vert RV3

6 Controls	
Main heating 1 - type: Programmer, room thermostat, and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: Cylinder thermostat and HW separately timed	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	1.91 kWp
Orientation	South East
Pitch	30°
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-D-TH-Be Lean	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	92 A	**DER**	8.64	**TER**	8.70
Environmental	92 A	**% DER < TER**			0.69
CO_2 Emissions (t/year)	0.95	**DFEE**	32.87	**TFEE**	29.02
Compliance Check	See BREL	**% DFEE < TFEE**			-13.29
% DPER < TPER	-3.79	**DPER**	46.98	**TPER**	45.26

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Unknown	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	8.59 m	41.00 m²	2.50 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	20.50	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	25.53	0.00	None	25.32	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	70.60	0.00	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	+1	Plasterboard ceiling, carpeted chipboard floor	54.00

Internal Ceiling 2	+2	Plasterboard ceiling, carpeted chipboard floor	42.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	31.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	West	14.89	0
Opening	Opening Type 2	External Wall 1	East	7.90	0
Door	Opening Type 1	External Wall 1	East	2.53	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Table K1 - Default	8.59	0.32	0.32	Yes
E6 Intermediate floor within a dwelling	Table K1 - Default	25.40	0.14	0.14	Yes
E18 Party wall between dwellings	Table K1 - Default	30.00	0.24	0.24	Yes
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	19.20	0.00	0.00	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	33.00	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)	Table K1 - Default	12.60	0.48	0.48	No

Y-value	0.13	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

Summary for Input Data

elmhurst energy

24.0 Main Heating 1	Manufacturer	
Description	Notional Spec Boiler	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	104	
In Winter	89.10	
In Summer	89.10	
Model Name	Notional	
Manufacturer	Notional	
System Type	Notional	
Controls SAP Code	2106	
Delayed Start Stat	Yes	
Burner Control	Modulating	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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	Yes	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Summer Immersion	No	
Cold Water Source	From mains	
Bath Count	1	
Supplementary Immersion	No	

Summary for Input Data

elmhurst energy

Immersion Only Heating Hot Water	Yes

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		Yes	Storage System

28.3 Waste Water Heat Recovery System

Instantaneous System 1

Database ID	80003	
Brand Model	Showersave, Recoh-vert RV3	
Details	Year: 2011 + 2017 Efficiency: 0 Utilisation factor: 0.974	

29.0 Hot Water Cylinder	None	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Jacket	
Insulation Thickness Type	50 mm	
Insulation Thickness	50	
Cylinder Volume	150.00	L
Loss	1.92	kWh/day
Pipes insulation	All accessible pipework insulated	
In Airing Cupboard	No	

31.0 Thermal Store	Hot water	
Thermal Store Pipework	connected by > 1.5 m pipework	

32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
1.91	South East	30°	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

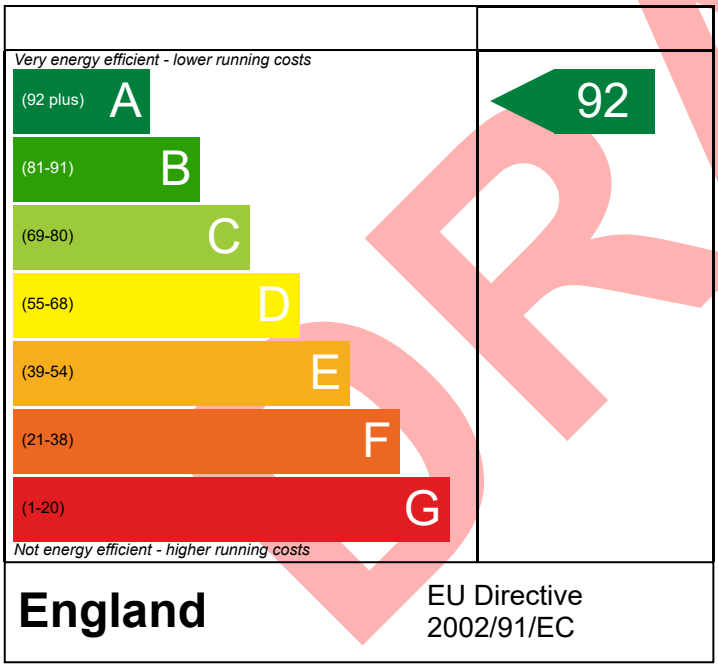
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	House, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	126 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

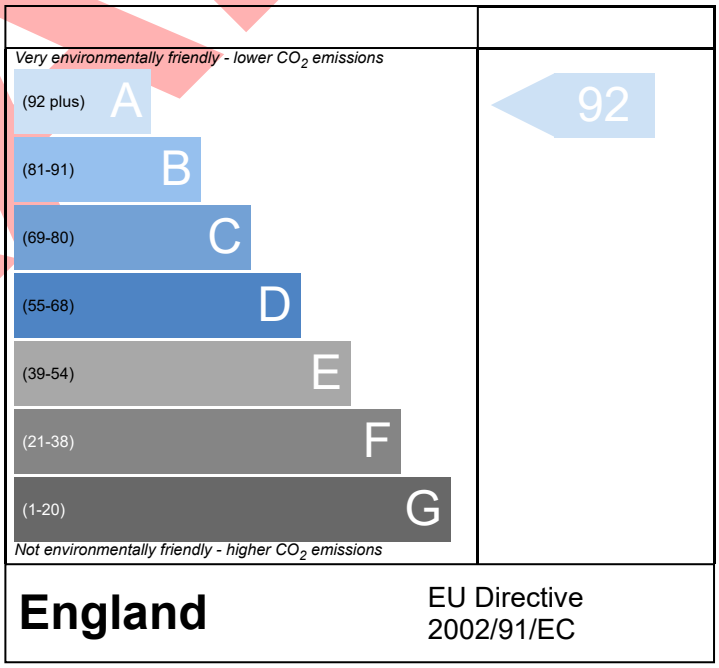
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

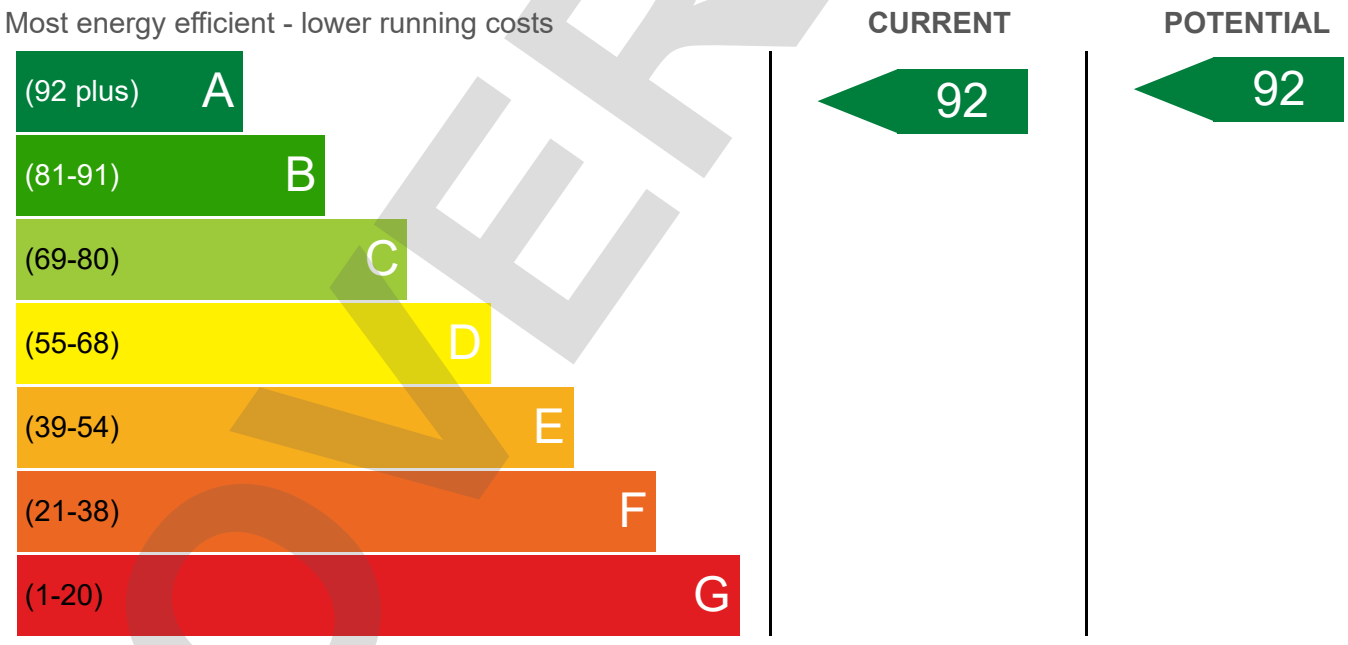
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m^2]	126

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 41 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.9** per year

Overview Report

With the recommended measures the potential CO emissions could be: 1 per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£193

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:19

Project Information			
Assessed By	Keith Ketchley	Building Type	Flat, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	71 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-F-2B4P-Be Lean
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Mains gas	
Target carbon dioxide emission rate	*13.31 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	10.65 $kgCO_2/m^2$	**OK**
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*70.93 kWh_{PE}/m^2*	
Dwelling primary energy	57.96 kWh_{PE}/m^2	**OK**
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*35.6 kWh/m^2*	
Dwelling fabric energy efficiency	36.3 kWh/m^2	**FAIL**

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	**OK**
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	**OK**
Roofs	*0.16*	N/A	N/A	**N/A**
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	**OK**
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	33.65	0.15
Party wall: Party Wall (1)	55.65	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	31	0.12

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	2.4	North	0.8	1.3
Opening, Opening Type 2	2.4	North	0.8	1.3
Patio Door, Opening Type 2	5.6	North	0.8	1.3
Opening, Opening Type 2	2.4	West	0.8	1.3
Opening, Opening Type 2	2.4	West	0.8	1.3
Front Door, Opening Type 1	2	South	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	SAP table default	0.32	
External wall	E18: Party wall between dwellings	SAP table default	0.24	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Boiler with radiators or underfloor heating - Mains gas	
Efficiency	89.1%
Emitter type	Radiators
Flow temperature	45°C
System type	Notional
Manufacturer	Notional
Model	Notional
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: Instantaneous	
Efficiency	0.0%
Manufacturer	Hei-tech b.v.
Model	Recoh-vert RV3

6 Controls	
Main heating 1 - type: Programmer, room thermostat, and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	1.46 kWp
Orientation	South East
Pitch	30°
Overshading	0.8 (overshading factor calculated according to MCS)
Manufacturer	
MCS certificate	

10 Heat networks

N/A

11 Supporting documentary evidence

N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-F-2B4P-Be Lean	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	90 B	**DER**	10.65	**TER**	13.31
Environmental	92 A	**% DER < TER**			19.98
CO_2 Emissions (t/year)	0.66	**DFEE**	36.32	**TFEE**	35.58
Compliance Check	See BREL	**% DFEE < TFEE**			-2.07
% DPER < TPER	18.29	**DPER**	57.96	**TPER**	70.93

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Northeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	15.00 m	71.00 m²	3.00 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area 24.60 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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	33.65	0.00	None	17.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	54.00

Internal Ceiling 2	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor		42.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	31.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Solid Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	North	2.40	0
Opening	Opening Type 2	External Wall 1	North	2.40	0
Patio Door	Opening Type 2	External Wall 1	North	5.60	0
Opening	Opening Type 2	External Wall 1	West	2.40	0
Opening	Opening Type 2	External Wall 1	West	2.40	0
Front Door	Opening Type 1	External Wall 1	South	2.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Table K1 - Default	15.00	0.32	0.32	Yes
E18 Party wall between dwellings	Table K1 - Default	12.00	0.24	0.24	Yes

Y-value	0.09	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Manufacturer

Summary for Input Data

Description	Notional Spec Boiler	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	104	
In Winter	89.10	
In Summer	89.10	
Model Name	Notional	
Manufacturer	Notional	
System Type	Notional	
Controls SAP Code	2106	
Delayed Start Stat	Yes	
Burner Control	Modulating	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	45.00	
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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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	Yes
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

Summary for Input Data

elmhurst energy

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

Instantaneous System 1

Database ID	80003	
Brand Model	Showersave, Recoh-vert RV3	
Details	Year: 2011 + 2017 Efficiency: 0 Utilisation factor: 0.974	

29.0 Hot Water Cylinder	None	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	

31.0 Thermal Store	None	

32.0 Photovoltaic Unit	Multiple Dwellings – Connected	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
1.46	South East	30°	Modest	No	Yes	0.80		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

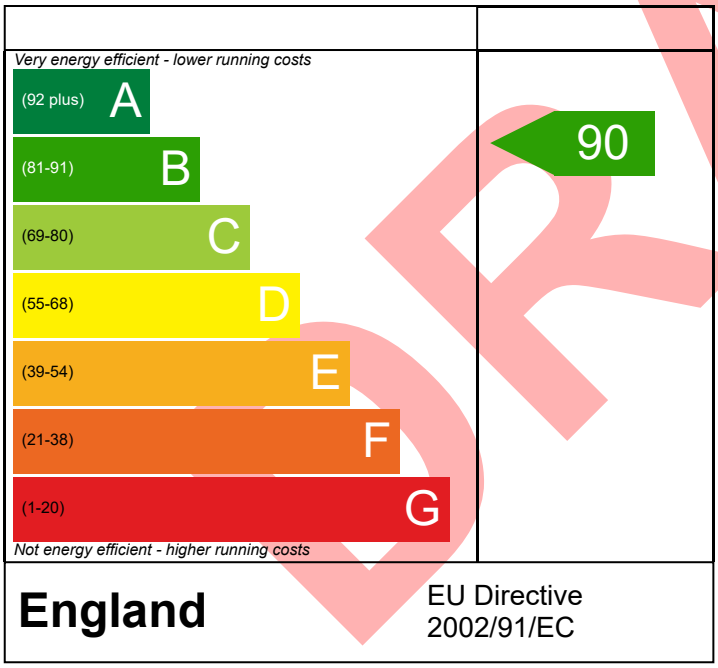
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	Flat, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	71 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

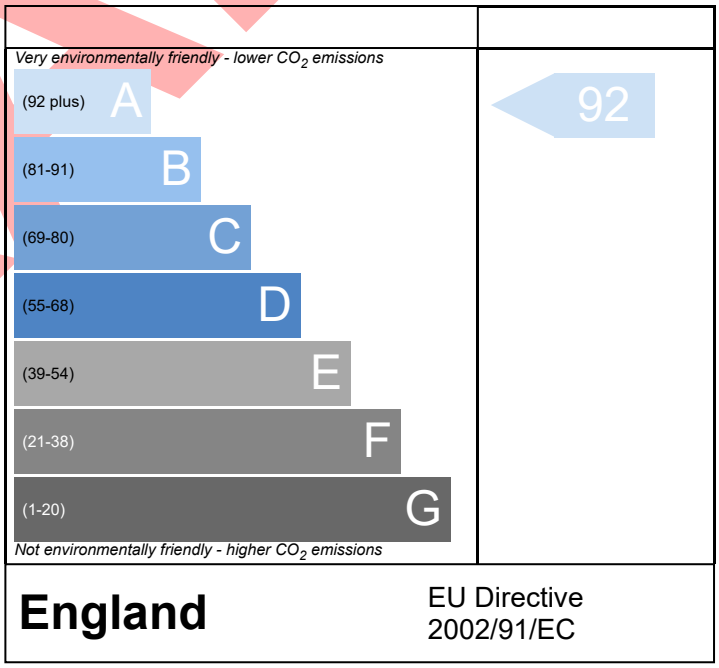
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

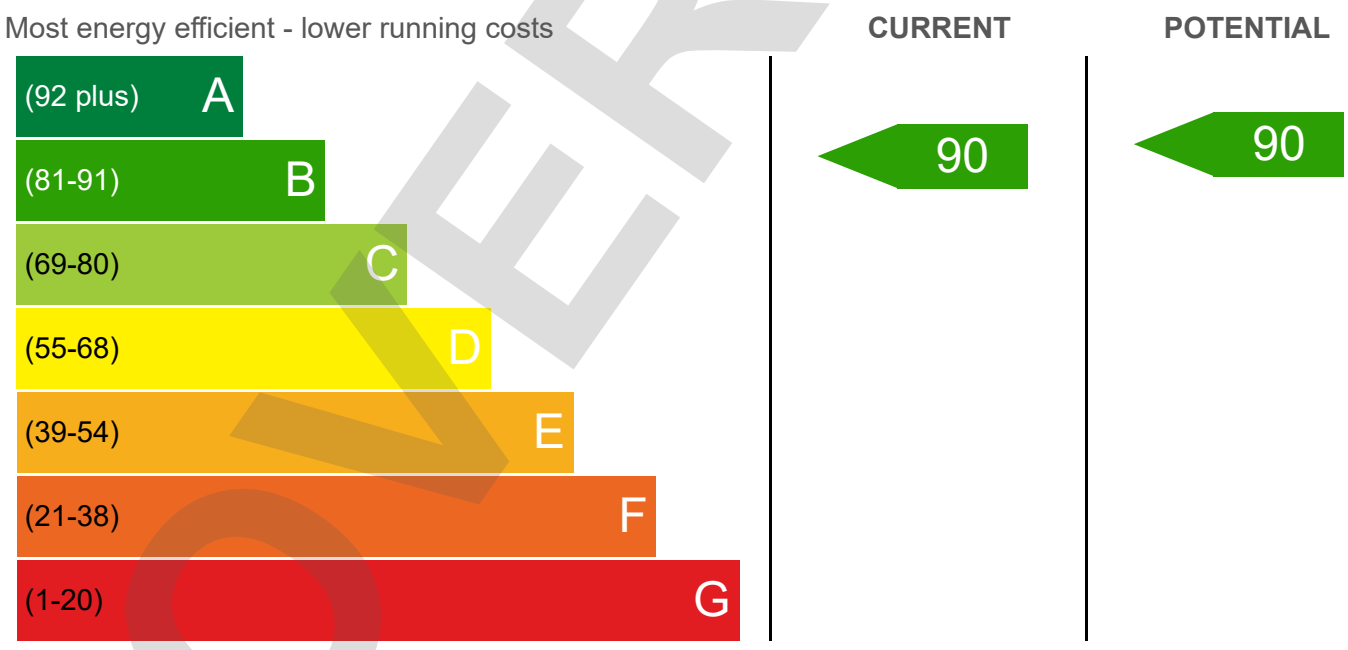
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Mid-Terrace
Floor Area [m^2]	71

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 50 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.7** per year

With the recommended measures the potential CO emissions could be: **1** per year

Overview Report

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£171

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:20

Project Information			
Assessed By	Keith Ketchley	Building Type	Flat, Detached
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	71 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs - 3F 2B4P - Be Lean
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Mains gas	
Target carbon dioxide emission rate	*11.93 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	11.75 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*62.68 kWh_{PE}/m^2*	
Dwelling primary energy	67.57 kWh_{PE}/m^2	FAIL
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*33.2 kWh/m^2*	
Dwelling fabric energy efficiency	30.5 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	N/A	N/A	**N/A**
Roofs	*0.16*	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	26.7	0.15
Exposed roof: Roof (1)	71	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	2.4	North	0.8	1.3
Opening, Opening Type 2	2.4	North	0.8	1.3
Patio Door, Opening Type 2	5.6	North	0.8	1.3
Opening, Opening Type 2	2.4	East	0.8	1.3
Opening, Opening Type 2	2.4	East	0.8	1.3
Opening, Opening Type 1	2	South	N/A	1.3
Front Door, Opening Type 1	2	South	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E7: Party floor between dwellings (in blocks of flats)	Not government-approved scheme	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E16: Corner (normal)	Not government-approved scheme	0 **(!)**	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Boiler with radiators or underfloor heating - Mains gas	
Efficiency	89.1%
Emitter type	Radiators
Flow temperature	45°C
System type	Notional
Manufacturer	Notional
Model	Notional
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: Instantaneous	
Efficiency	0.0%
Manufacturer	Hei-tech b.v.
Model	Recoh-vert RV3

6 Controls	
Main heating 1 - type: Programmer, room thermostat, and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation
N/A

10 Heat networks
N/A

11 Supporting documentary evidence

N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs - 3F 2B4P - Be Lean	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	85 B	**DER**	11.75	**TER**	11.93
Environmental	91 B	**% DER < TER**			1.51
CO_2 Emissions (t/year)	0.77	**DFEE**	30.54	**TFEE**	33.17
Compliance Check	See BREL	**% DFEE < TFEE**			7.92
% DPER < TPER	-7.80	**DPER**	67.57	**TPER**	62.68

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Northeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Top-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	45.95 m	71.30 m²	2.50 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	26.00	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	45.90	26.70	0.00	None	19.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	71.00	0.00	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Solid Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	North	2.40	0
Opening	Opening Type 2	External Wall 1	North	2.40	0
Patio Door	Opening Type 2	External Wall 1	North	5.60	0
Opening	Opening Type 2	External Wall 1	East	2.40	0
Opening	Opening Type 2	External Wall 1	East	2.40	0
Opening	Opening Type 1	External Wall 1	South	2.00	0
Front Door	Opening Type 1	External Wall 1	South	2.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E7 Party floor between dwellings (in blocks of flats)	Non Gov Approved Schemes	45.95	0.00	0.00	Yes
E16 Corner (normal)	Non Gov Approved Schemes	10.00	0.00	0.00	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Manufacturer

Summary for Input Data

Description	Notional Spec Boiler	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	104	
In Winter	89.10	
In Summer	89.10	
Model Name	Notional	
Manufacturer	Notional	
System Type	Notional	
Controls SAP Code	2106	
Delayed Start Stat	Yes	
Burner Control	Modulating	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	45.00	
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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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	Yes
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

Summary for Input Data

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

Instantaneous System 1

Database ID	80003	
Brand Model	Showersave, Recoh-vert RV3	
Details	Year: 2011 + 2017 Efficiency: 0 Utilisation factor: 0.974	

29.0 Hot Water Cylinder	None	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	

31.0 Thermal Store	None	

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

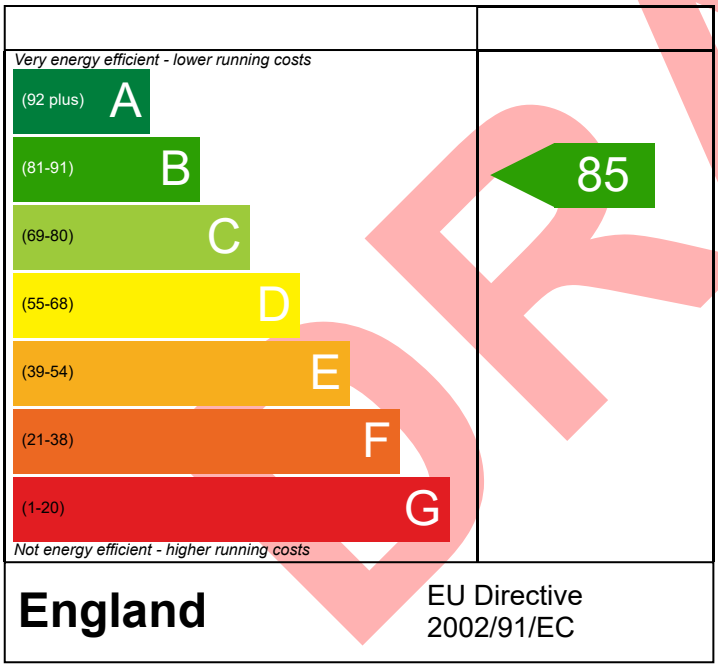
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	Flat, Detached
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	71.3 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

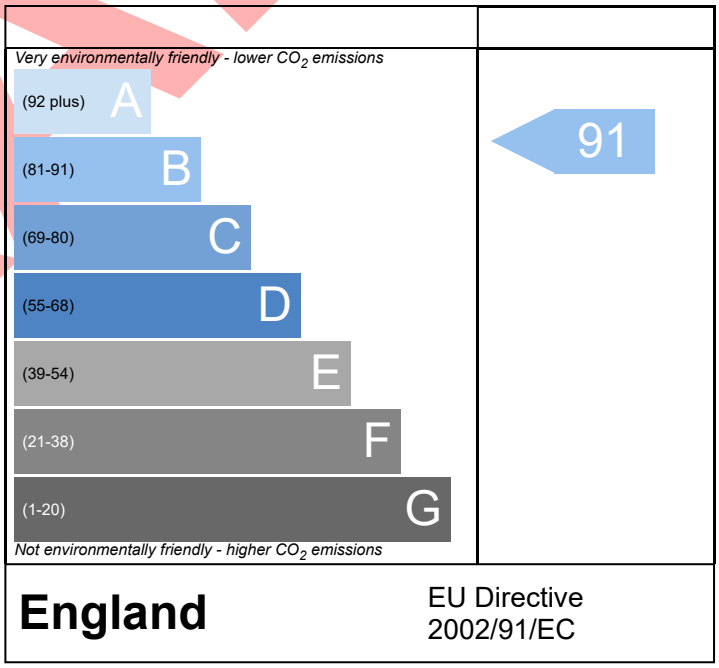
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

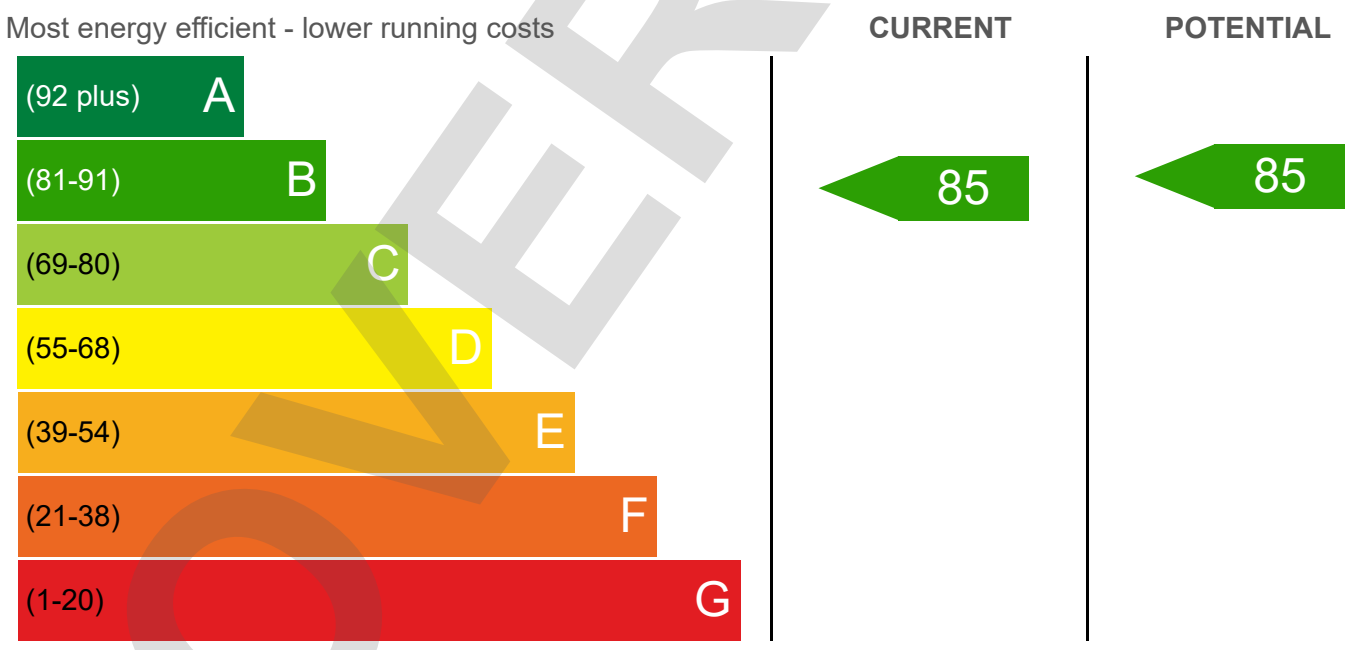
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Detached
Floor Area [m^2]	71

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 62 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.8** per year

With the recommended measures the potential CO emissions could be: **1** per year

Overview Report

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£287

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	27/04/2023
Date of certificate	27/04/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:20

Project Information			
Assessed By	Keith Ketchley	Building Type	House, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	80 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-G-TH-Be Lean
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Mains gas	
Target carbon dioxide emission rate	*10.54 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	7.46 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*55.2 kWh_{PE}/m^2*	
Dwelling primary energy	44.87 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*38.6 kWh/m^2*	
Dwelling fabric energy efficiency	34.0 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	OK
Roofs	*0.16*	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	1.3	Opening, North (1.3)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	34.77	0.15
Party wall: Party Wall (1)	32.5	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	57.09	0.12
Exposed roof: Roof (1)	71.2	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	8.15	North	0.8	1.3
Opening, Opening Type 2	5.4	East	0.8	1.3
Door, Opening Type 1	2.53	East	N/A	1.3
Opening, Opening Type 3	5	North	0.7	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	Government-approved scheme	0 **(!)**	
External wall	E6: Intermediate floor within a dwelling	Government-approved scheme	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E18: Party wall between dwellings	Government-approved scheme	0 **(!)**	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Boiler with radiators or underfloor heating - Mains gas	
Efficiency	89.1%
Emitter type	Radiators
Flow temperature	45°C
System type	Notional
Manufacturer	Notional
Model	Notional
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: Instantaneous	
Efficiency	0.0%
Manufacturer	Hei-tech b.v.
Model	Recoh-vert RV3

6 Controls	
Main heating 1 - type: Programmer, room thermostat, and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	3.5 kWp
Orientation	South East
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-G-TH-Be Lean	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	93 A	**DER**	7.46	**TER**	10.54
Environmental	94 A	**% DER < TER**			29.22
CO_2 Emissions (t/year)	0.48	**DFEE**	33.97	**TFEE**	38.64
Compliance Check	See BREL	**% DFEE < TFEE**			12.10
% DPER < TPER	18.71	**DPER**	44.87	**TPER**	55.20

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Unknown	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Which Floor	0	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	10.90 m	57.00 m²	2.50 m
1st Storey:	11.20 m	23.15 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	23.03	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	34.77	0.00	None	16.08	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	32.50	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	76.20	5.00	None	0.00	Enter Gross Area	5.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	+1	Plasterboard ceiling, carpeted chipboard floor	23.15

Summary for Input Data

elmhurst energy

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	57.09

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 3	Manufacturer	Roof Light	Triple Low-E Soft 0.05		Air Filled	0.57	Wood	0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	North	8.15	0
Opening	Opening Type 2	External Wall 1	East	5.40	0
Door	Opening Type 1	External Wall 1	East	2.53	0
Opening	Opening Type 3	External Roof 1	North	5.00	11

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Gov Approved Scheme	10.90	0.00	0.00	Yes
E6 Intermediate floor within a dwelling	Gov Approved Scheme	11.20	0.00	0.00	Yes
E18 Party wall between dwellings	Gov Approved Scheme	20.00	0.00	0.00	Yes

Y-value	0.00	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Manufacturer	
Description	Notional	

Summary for Input Data

Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	104	
In Winter	89.10	
In Summer	89.10	
Model Name	Notional	
Manufacturer	Notional	
System Type	Notional	
Controls SAP Code	2106	
Delayed Start Stat	Yes	
Burner Control	Modulating	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	45.00	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
Combi keep hot type	Electric, time clock	

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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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	Yes
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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System
Instantaneous System 1

Database ID	80003	
Brand Model	Showersave, Recoh-vert RV3	
Details	Year: 2011 + 2017 Efficiency: 0 Utilisation factor: 0.974	

29.0 Hot Water Cylinder	None	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	

31.0 Thermal Store	None	

32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
3.50	South East	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	House, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	80.15 m²
DRRN:	

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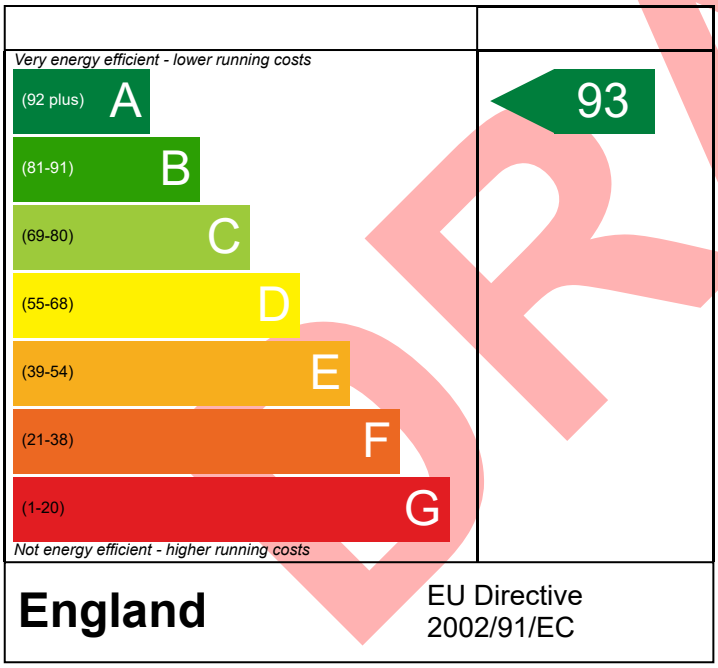
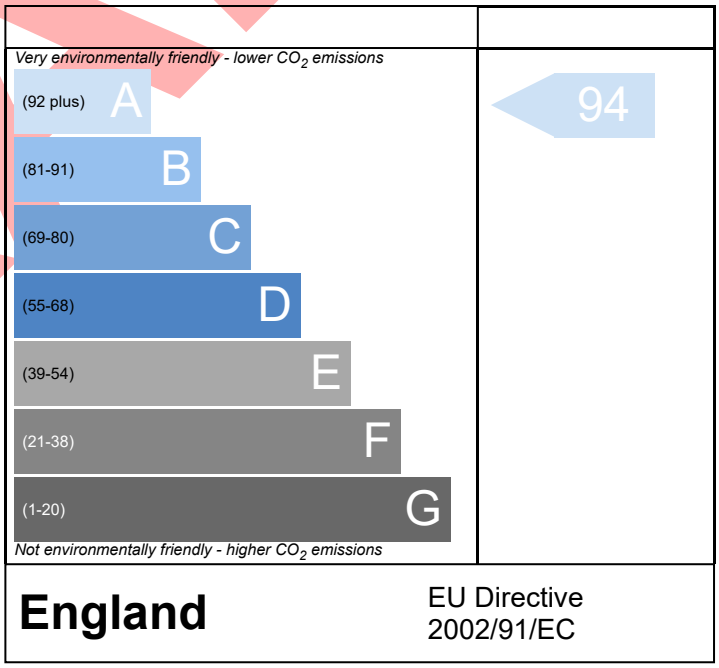
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

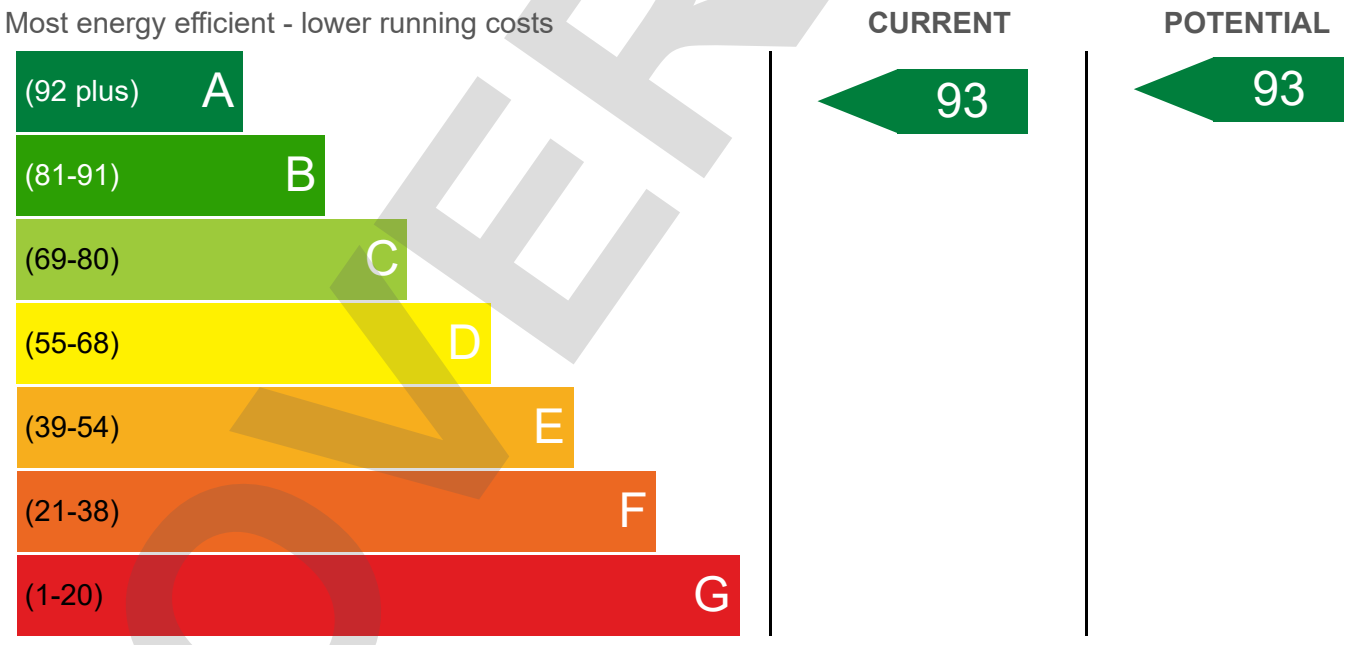
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m^2]	80

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 37 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.5** per year

Overview Report

With the recommended measures the potential CO emissions could be: **0** per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£107

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	28/04/2023
Date of certificate	28/04/2023
Type of assessment	SAP, new dwelling

Appendix C – SAP Analysis BE GREEN

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:20

Project Information			
Assessed By	Keith Ketchley	Building Type	Flat, Detached
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	72 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-A-2B4P-Be Green
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*9.2 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	1.94 $kgCO_2/m^2$	**OK**
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*47.96 kWh_{PE}/m^2*	
Dwelling primary energy	21.83 kWh_{PE}/m^2	**OK**
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*23.5 kWh/m^2*	
Dwelling fabric energy efficiency	20.4 kWh/m^2	**OK**

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	**OK**
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	N/A	N/A	**N/A**
Roofs	*0.16*	N/A	N/A	**N/A**
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	**OK**
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	29.7	0.15

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	2.5	East	0.8	1.3
Opening, Opening Type 2	2.5	East	0.8	1.3
Patio Door, Opening Type 2	5.6	East	0.8	1.3
Opening, Opening Type 2	3.6	West	0.8	1.3
Front Door, Opening Type 1	2	North	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E7: Party floor between dwellings (in blocks of flats)	Government-approved scheme	0 **(!)**	
External wall	E16: Corner (normal)	Government-approved scheme	0 **(!)**	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	287.9%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Daikin Europe NV
Model	ERLQ008CAV3 + EHVH08SU26CB6W
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer, room thermostat and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	0.47 kWp
Orientation	South
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks

N/A

11 Supporting documentary evidence

N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-A-2B4P-Be Green	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	92 A	**DER**	1.94	**TER**	9.20
Environmental	98 A	**% DER < TER**			78.91
CO_2 Emissions (t/year)	0.13	**DFEE**	20.40	**TFEE**	23.45
Compliance Check	See BREL	**% DFEE < TFEE**			13.00
% DPER < TPER	54.49	**DPER**	21.83	**TPER**	47.96

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Northeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	27.00 m	72.00 m²	2.50 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	25.00	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	45.90	29.70	0.00	None	16.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Dense block, plasterboard on dabs	75.00	43.22

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)

Party Ceiling 1	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Solid Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	East	2.50	0
Opening	Opening Type 2	External Wall 1	East	2.50	0
Patio Door	Opening Type 2	External Wall 1	East	5.60	0
Opening	Opening Type 2	External Wall 1	West	3.60	0
Front Door	Opening Type 1	External Wall 1	North	2.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E7 Party floor between dwellings (in blocks of flats)	Gov Approved Scheme	27.00	0.00	0.00	Yes
E16 Corner (normal)	Gov Approved Scheme	10.00	0.00	0.00	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

Summary for Input Data

elmhurst energy

24.0 Main Heating 1	Database	
Description	Electric Heat Pumps	
Percentage of Heat	100.00	%
Database Ref. No.	102672	
Fuel Type	Electricity	
SAP Code	0	
In Winter	0.00	
In Summer	0.00	
Model Name	ERLQ008CAV3 + EHVH08SU26CB6W	
Manufacturer	Daikin Europe NV	
System Type	Heat Pump	
Controls SAP Code	2210	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
Boiler Interlock	No	
Combi boiler type	No 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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

Summary for Input Data

elmhurst energy

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.47	South	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

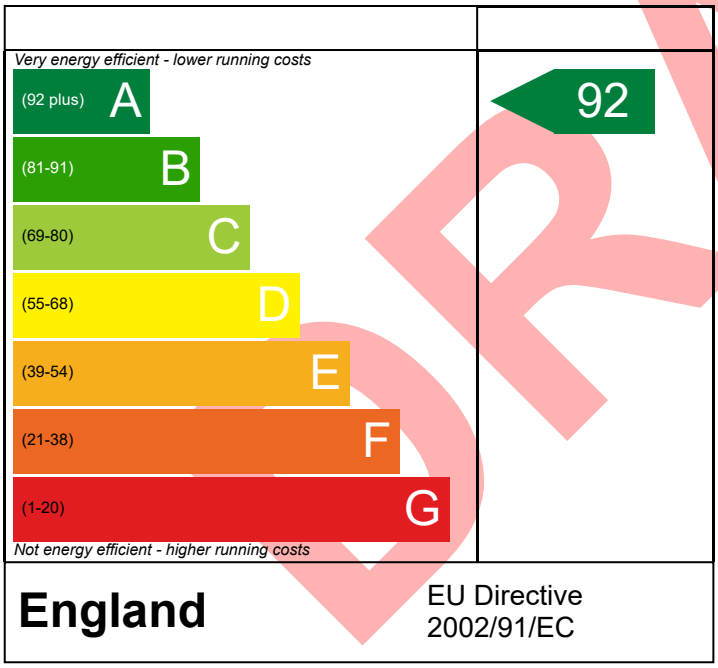
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	Flat, Detached
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	72 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

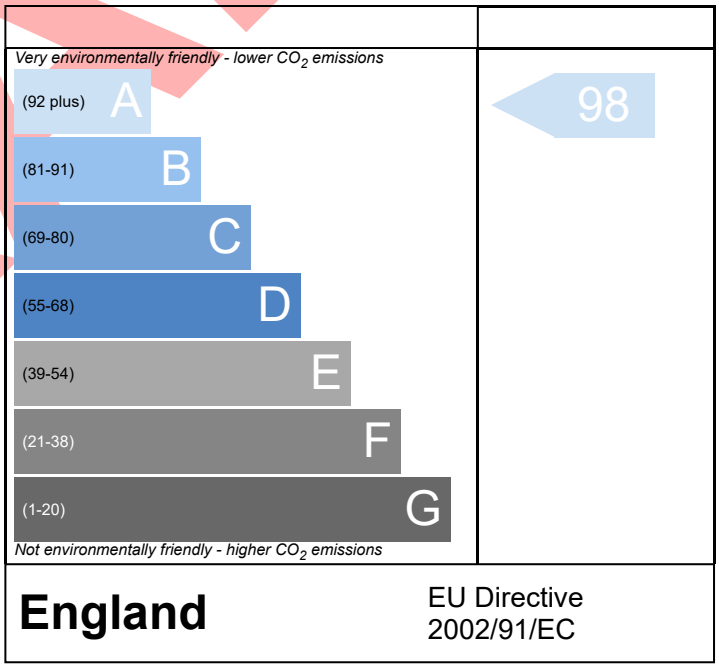
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

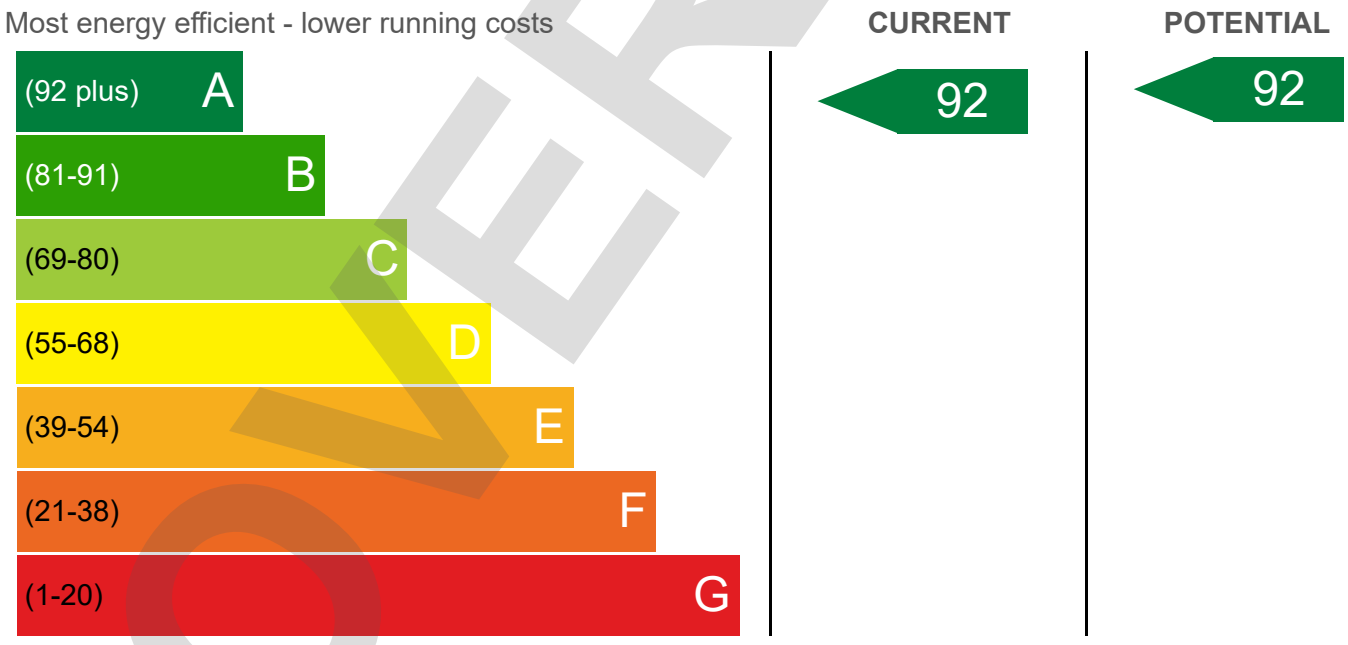
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Detached
Floor Area [m^2]	72

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators, electric	Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 20 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.1** per year

With the recommended measures the potential CO emissions could be: **0** per year

Recommendations

Overview Report

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£175

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Overview Report

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:20

Project Information			
Assessed By	Keith Ketchley	Building Type	House, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	126 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-C-TH-Be Green
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*7.73 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	2.05 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*40.02 kWh_{PE}/m^2*	
Dwelling primary energy	22.32 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*27.4 kWh/m^2*	
Dwelling fabric energy efficiency	31.6 kWh/m^2	FAIL

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	OK
Roofs	*0.16*	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	25.53	0.15
Party wall: Party Wall (1)	188.5	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	42.04	0.12
Exposed roof: Roof (1)	24.1	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	14.89	West	0.8	1.3
Opening, Opening Type 2	7.9	East	0.8	1.3
Door, Opening Type 1	2.53	East	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	SAP table default	0.32	
External wall	E6: Intermediate floor within a dwelling	SAP table default	0.14	
External wall	E18: Party wall between dwellings	SAP table default	0.24	
Party wall	P3: Intermediate floor between	SAP table default	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
	dwellings (in blocks of flats)			
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 **(!)**	
Party wall	P5: Roof (insulation at rafter level)	SAP table default	0.48	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	320.0%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Daikin Europe NV
Model	ERLQ008CAV3 + EHVH08SU26CB6W
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer, room thermostat and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	0.66 kWp
Orientation	South
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-C-TH-Be Green	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	90 B	**DER**	2.05	**TER**	7.73
Environmental	98 A	**% DER < TER**			73.48
CO_2 Emissions (t/year)	0.22	**DFEE**	31.60	**TFEE**	27.37
Compliance Check	See BREL	**% DFEE < TFEE**			-15.47
% DPER < TPER	44.23	**DPER**	22.32	**TPER**	40.02

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Unknown	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	23.87 m	41.00 m²	2.50 m
1st Storey:	23.87 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	20.50	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	25.53	0.00	None	25.32	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	188.50	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.11	9.00	24.10	0.00	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	+1	Plasterboard ceiling, carpeted chipboard floor	40.80

Summary for Input Data

elmhurst energy

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	42.04

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	West	14.89	0
Opening	Opening Type 2	External Wall 1	East	7.90	0
Door	Opening Type 1	External Wall 1	East	2.53	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Table K1 - Default	8.59	0.32	0.32	Yes
E6 Intermediate floor within a dwelling	Table K1 - Default	25.40	0.14	0.14	Yes
E18 Party wall between dwellings	Table K1 - Default	30.00	0.24	0.24	Yes
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	19.20	0.00	0.00	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	33.00	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)	Table K1 - Default	12.60	0.48	0.48	No

Y-value	0.17	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues	
21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Database

Summary for Input Data

Description	Electric Heat Pumps	
Percentage of Heat	100.00	%
Database Ref. No.	102672	
Fuel Type	Electricity	
SAP Code	0	
In Winter	0.00	
In Summer	0.00	
Model Name	ERLQ008CAV3 + EHVH08SU26CB6W	
Manufacturer	Daikin Europe NV	
System Type	Heat Pump	
Controls SAP Code	2210	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
Boiler Interlock	No	
Combi boiler type	No 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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.66	South	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

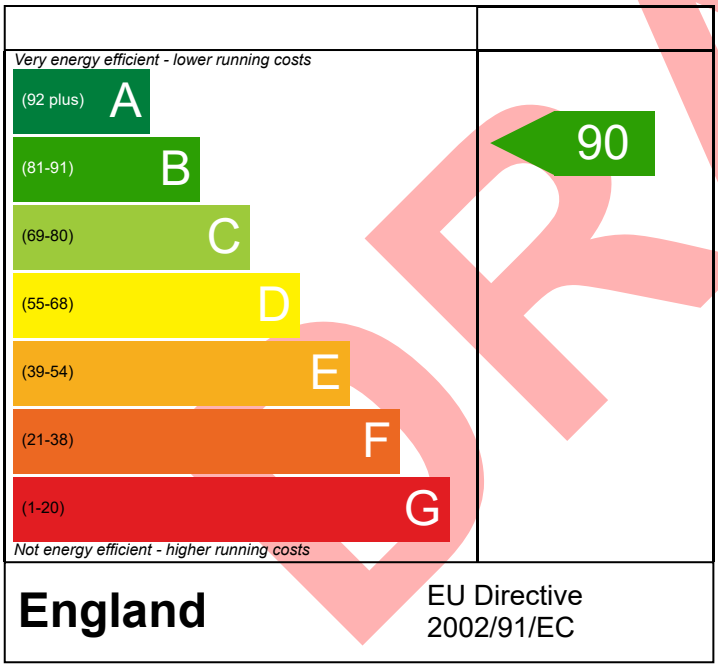
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	House, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	126 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

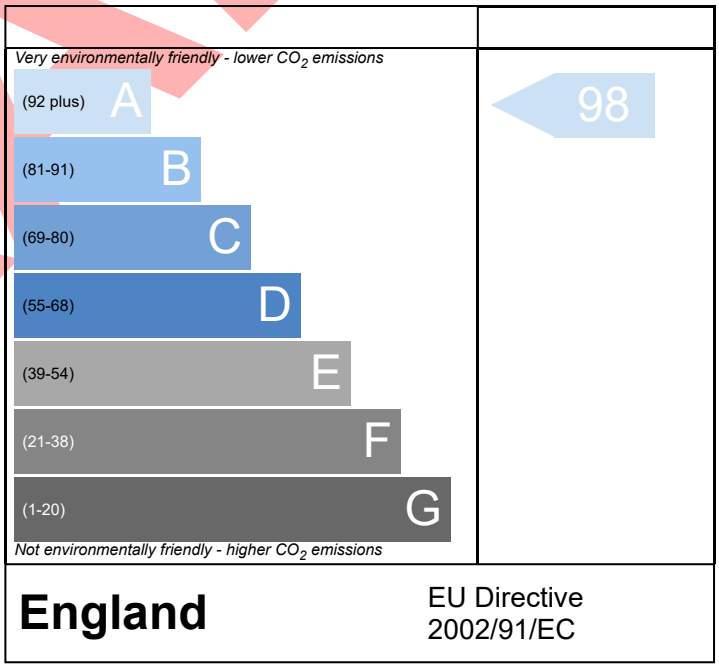
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

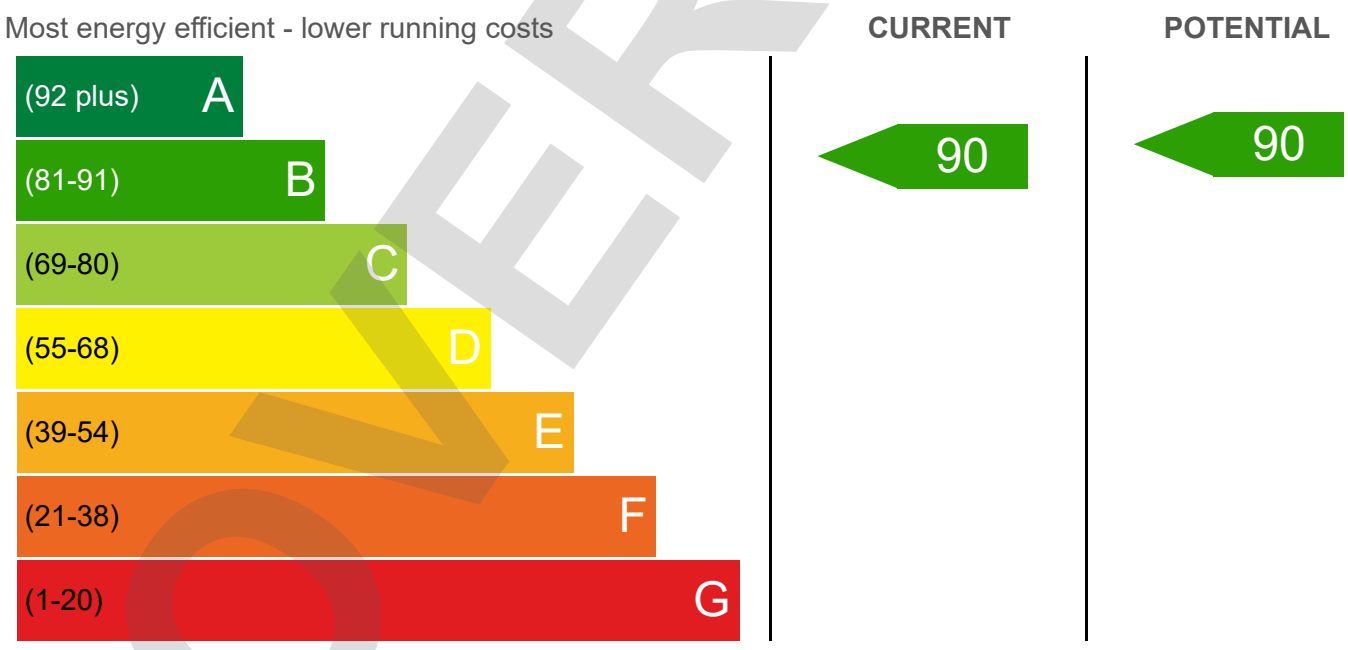
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m^2]	126

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators, electric	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 20 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.2** per year

Overview Report

With the recommended measures the potential CO emissions could be: **0** per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£292

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:19

Project Information			
Assessed By	Keith Ketchley	Building Type	House, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	126 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-D-TH-Be Green
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*8.02 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	2.18 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*41.6 kWh_{PE}/m^2*	
Dwelling primary energy	23.69 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*29.0 kWh/m^2*	
Dwelling fabric energy efficiency	32.9 kWh/m^2	FAIL

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	OK
Roofs	*0.16*	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	25.53	0.15
Party wall: Party Wall (1)	55.65	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	31	0.12
Exposed roof: Roof (1)	70.6	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	14.89	West	0.8	1.3
Opening, Opening Type 2	7.9	East	0.8	1.3
Door, Opening Type 1	2.53	East	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	SAP table default	0.32	
External wall	E6: Intermediate floor within a dwelling	SAP table default	0.14	
External wall	E18: Party wall between dwellings	SAP table default	0.24	
Party wall	P3: Intermediate floor between	SAP table default	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
	dwellings (in blocks of flats)			
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 **(!)**	
Party wall	P5: Roof (insulation at rafter level)	SAP table default	0.48	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	318.8%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Daikin Europe NV
Model	ERLQ008CAV3 + EHVH08SU26CB6W
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer, room thermostat and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	0.66 kWp
Orientation	South
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-D-TH-Be Green	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	89 B	**DER**	2.18	**TER**	8.02
Environmental	98 A	**% DER < TER**			72.82
CO_2 Emissions (t/year)	0.24	**DFEE**	32.87	**TFEE**	29.02
Compliance Check	See BREL	**% DFEE < TFEE**			-13.29
% DPER < TPER	43.06	**DPER**	23.69	**TPER**	41.60

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Unknown	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	8.59 m	41.00 m²	2.50 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	20.50	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	25.53	0.00	None	25.32	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	70.60	0.00	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	+1	Plasterboard ceiling, carpeted chipboard floor	54.00

Internal Ceiling 2	+2	Plasterboard ceiling, carpeted chipboard floor	42.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	31.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	West	14.89	0
Opening	Opening Type 2	External Wall 1	East	7.90	0
Door	Opening Type 1	External Wall 1	East	2.53	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Table K1 - Default	8.59	0.32	0.32	Yes
E6 Intermediate floor within a dwelling	Table K1 - Default	25.40	0.14	0.14	Yes
E18 Party wall between dwellings	Table K1 - Default	30.00	0.24	0.24	Yes
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	19.20	0.00	0.00	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	33.00	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)	Table K1 - Default	12.60	0.48	0.48	No

Y-value	0.13	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

Summary for Input Data

elmhurst energy

24.0 Main Heating 1	Database	
Description	Electric Heat Pumps	
Percentage of Heat	100.00	%
Database Ref. No.	102672	
Fuel Type	Electricity	
SAP Code	0	
In Winter	0.00	
In Summer	0.00	
Model Name	ERLQ008CAV3 + EHVH08SU26CB6W	
Manufacturer	Daikin Europe NV	
System Type	Heat Pump	
Controls SAP Code	2210	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
Boiler Interlock	No	
Combi boiler type	No 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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

Summary for Input Data

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.66	South	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

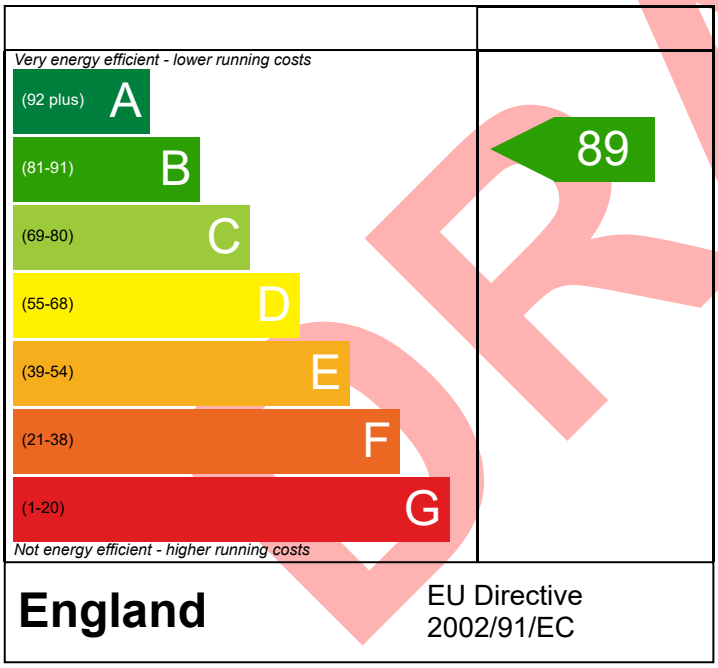
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	House, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	126 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

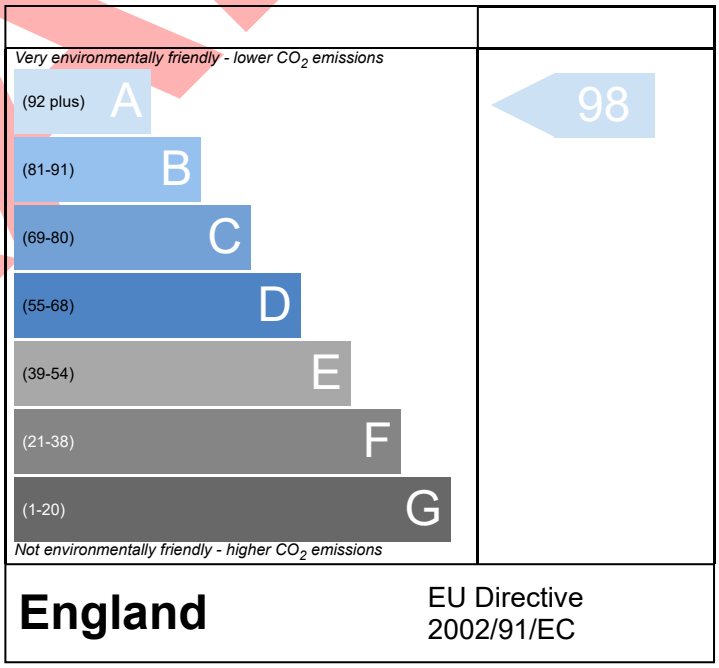
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

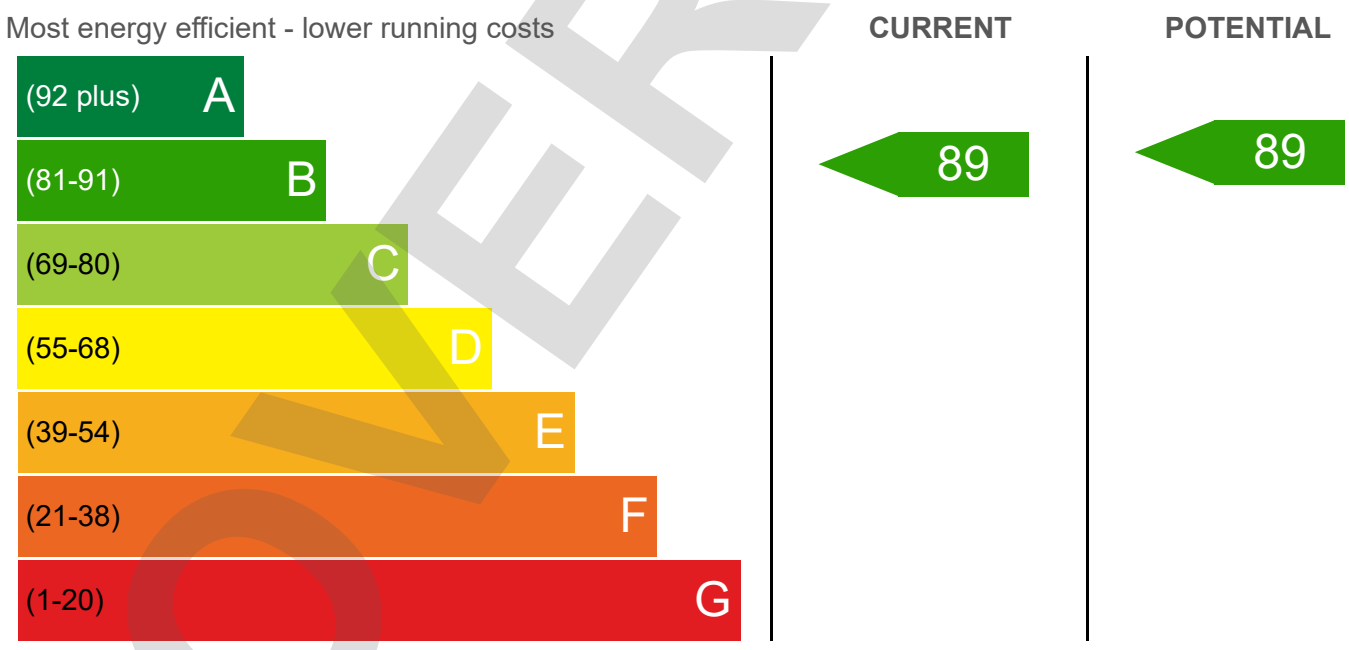
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m^2]	126

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators, electric	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 21 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.2** per year

Overview Report

With the recommended measures the potential CO emissions could be: **0** per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£314

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:19

Project Information			
Assessed By	Keith Ketchley	Building Type	Flat, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	71 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-F-2B4P-Be Green
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*12.84 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	2.69 kgCO_2/m^2	**OK**
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*68.38 kWh$_{PE}$/m^2*	
Dwelling primary energy	29.39 kWh$_{PE}$/m^2	**OK**
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*35.6 kWh/m^2*	
Dwelling fabric energy efficiency	36.3 kWh/m^2	**FAIL**

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	**OK**
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	**OK**
Roofs	*0.16*	N/A	N/A	**N/A**
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	**OK**
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	33.65	0.15
Party wall: Party Wall (1)	55.65	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	31	0.12

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	2.4	North	0.8	1.3
Opening, Opening Type 2	2.4	North	0.8	1.3
Patio Door, Opening Type 2	5.6	North	0.8	1.3
Opening, Opening Type 2	2.4	West	0.8	1.3
Opening, Opening Type 2	2.4	West	0.8	1.3
Front Door, Opening Type 1	2	South	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	SAP table default	0.32	
External wall	E18: Party wall between dwellings	SAP table default	0.24	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	304.5%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Daikin Europe NV
Model	ERLQ008CAV3 + EHVH08SU26CB6W
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer, room thermostat and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	0.47 kWp
Orientation	South
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks

N/A

11 Supporting documentary evidence

N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-F-2B4P-Be Green	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	89 B	**DER**	2.69	**TER**	12.84
Environmental	98 A	**% DER < TER**			79.05
CO_2 Emissions (t/year)	0.17	**DFEE**	36.32	**TFEE**	35.58
Compliance Check	See BREL	**% DFEE < TFEE**			-2.07
% DPER < TPER	57.02	**DPER**	29.39	**TPER**	68.38

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Northeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	15.00 m	71.00 m²	3.00 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	24.60	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	33.65	0.00	None	17.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	54.00

Internal Ceiling 2	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor		42.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	31.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Solid Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	North	2.40	0
Opening	Opening Type 2	External Wall 1	North	2.40	0
Patio Door	Opening Type 2	External Wall 1	North	5.60	0
Opening	Opening Type 2	External Wall 1	West	2.40	0
Opening	Opening Type 2	External Wall 1	West	2.40	0
Front Door	Opening Type 1	External Wall 1	South	2.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Table K1 - Default	15.00	0.32	0.32	Yes
E18 Party wall between dwellings	Table K1 - Default	12.00	0.24	0.24	Yes

Y-value	0.09	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Database

Summary for Input Data

Description	Electric Heat Pumps	
Percentage of Heat	100.00	%
Database Ref. No.	102672	
Fuel Type	Electricity	
SAP Code	0	
In Winter	0.00	
In Summer	0.00	
Model Name	ERLQ008CAV3 + EHVH08SU26CB6W	
Manufacturer	Daikin Europe NV	
System Type	Heat Pump	
Controls SAP Code	2210	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
Boiler Interlock	No	
Combi boiler type	No 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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.47	South	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

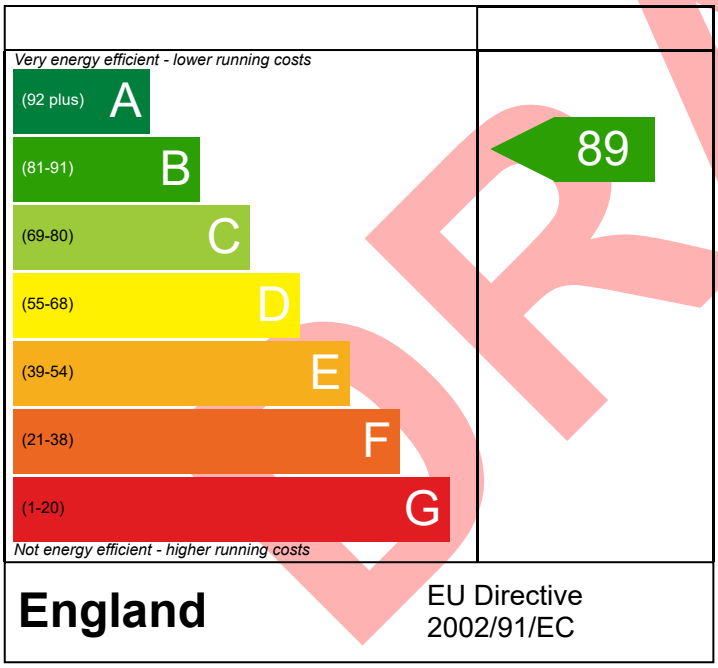
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	Flat, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	71 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

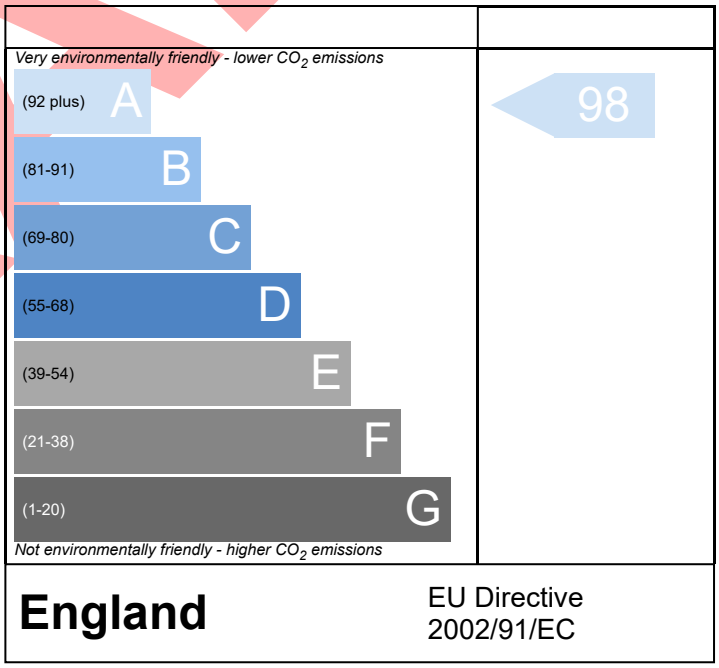
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

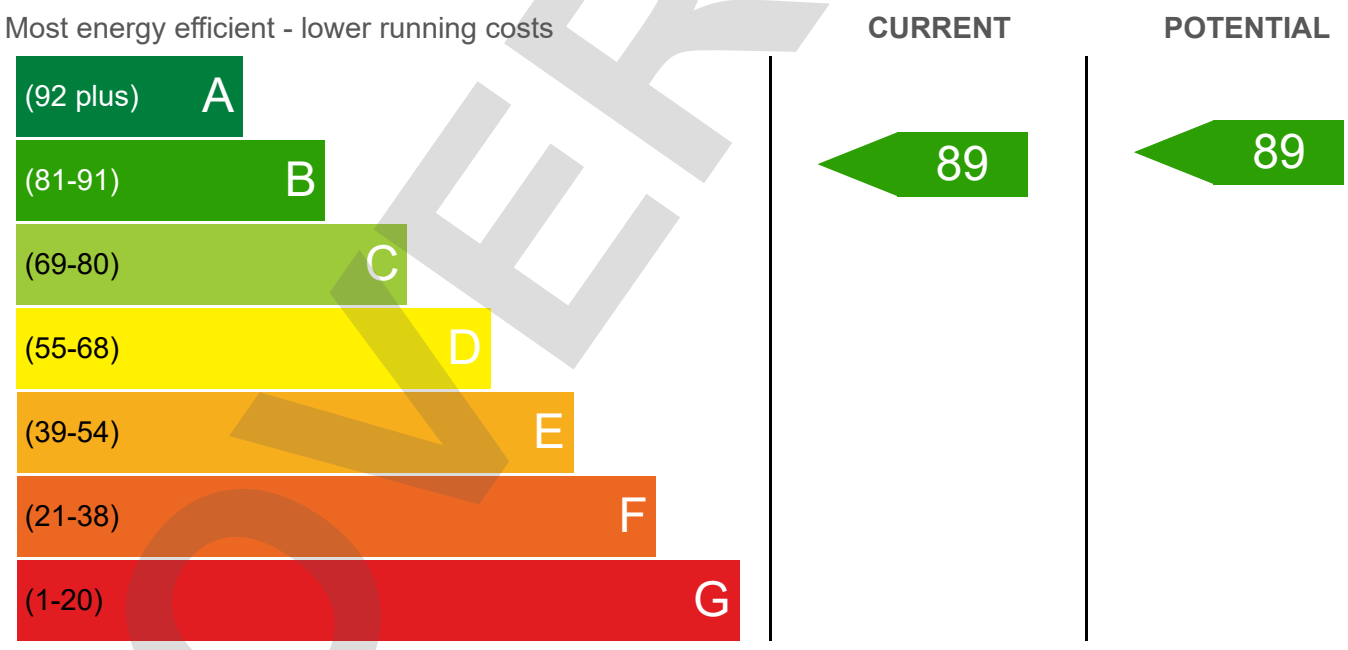
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Mid-Terrace
Floor Area [m^2]	71

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators, electric	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 26 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.2** per year

With the recommended measures the potential CO emissions could be: **0** per year

Overview Report

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£219

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:19

Project Information			
Assessed By	Keith Ketchley	Building Type	Flat, Detached
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	71 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs - 3F 2B4P - Be Green
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*11.28 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	2.46 kgCO_2/m^2	**OK**
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*59.14 kWh_{PE}/m^2*	
Dwelling primary energy	27.07 kWh_{PE}/m^2	**OK**
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*31.9 kWh/m^2*	
Dwelling fabric energy efficiency	30.6 kWh/m^2	**OK**

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	**OK**
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	N/A	N/A	**N/A**
Roofs	*0.16*	0.11	Roof (1) (0.11)	**OK**
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	**OK**
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	26.7	0.15
Exposed roof: Roof (1)	71.3	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	2.4	North	0.8	1.3
Opening, Opening Type 2	2.4	North	0.8	1.3
Patio Door, Opening Type 2	5.6	North	0.8	1.3
Opening, Opening Type 2	2.4	East	0.8	1.3
Opening, Opening Type 2	2.4	East	0.8	1.3
Opening, Opening Type 1	2	South	N/A	1.3
Front Door, Opening Type 1	2	South	N/A	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E7: Party floor between dwellings (in blocks of flats)	Government-approved scheme	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E16: Corner (normal)	Government-approved scheme	0 **(!)**	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	307.3%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Daikin Europe NV
Model	ERLQ008CAV3 + EHVH08SU26CB6W
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer, room thermostat and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	0.47 kWp
Orientation	South
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

elmhurst energy

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs - 3F 2B4P - Be Green	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	90 B	**DER**	2.46	**TER**	11.28
Environmental	98 A	**% DER < TER**			78.19
CO_2 Emissions (t/year)	0.16	**DFEE**	30.56	**TFEE**	31.92
Compliance Check	See BREL	**% DFEE < TFEE**			4.24
% DPER < TPER	54.22	**DPER**	27.07	**TPER**	59.14

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Northeast	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Top-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2023	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	18.40 m	71.30 m²	2.50 m
1st Storey:	12.70 m	54.00 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	26.00	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	45.90	26.70	0.00	None	19.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	55.65	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	71.30	0.00	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	In-situ concrete slab supported by profiled metal deck, carpeted	90.00	71.30

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Solid Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	North	2.40	0
Opening	Opening Type 2	External Wall 1	North	2.40	0
Patio Door	Opening Type 2	External Wall 1	North	5.60	0
Opening	Opening Type 2	External Wall 1	East	2.40	0
Opening	Opening Type 2	External Wall 1	East	2.40	0
Opening	Opening Type 1	External Wall 1	South	2.00	0
Front Door	Opening Type 1	External Wall 1	South	2.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E7 Party floor between dwellings (in blocks of flats)	Gov Approved Scheme	18.40	0.00	0.00	Yes
E16 Corner (normal)	Gov Approved Scheme	10.00	0.00	0.00	Yes

Y-value	0.00	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Database

Summary for Input Data

Description	Electric Heat Pumps	
Percentage of Heat	100.00	%
Database Ref. No.	102672	
Fuel Type	Electricity	
SAP Code	0	
In Winter	0.00	
In Summer	0.00	
Model Name	ERLQ008CAV3 + EHVH08SU26CB6W	
Manufacturer	Daikin Europe NV	
System Type	Heat Pump	
Controls SAP Code	2210	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
Boiler Interlock	No	
Combi boiler type	No 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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.47	South	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

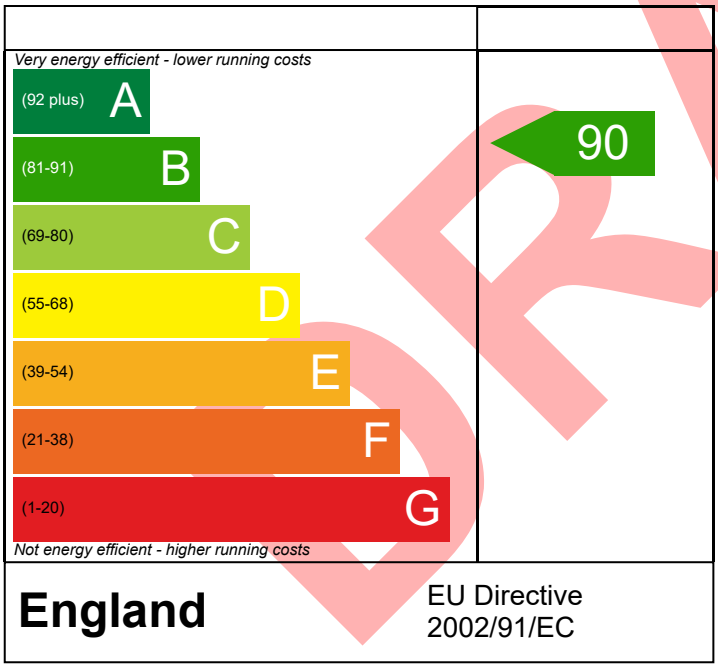
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	Flat, Detached
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	71.3 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

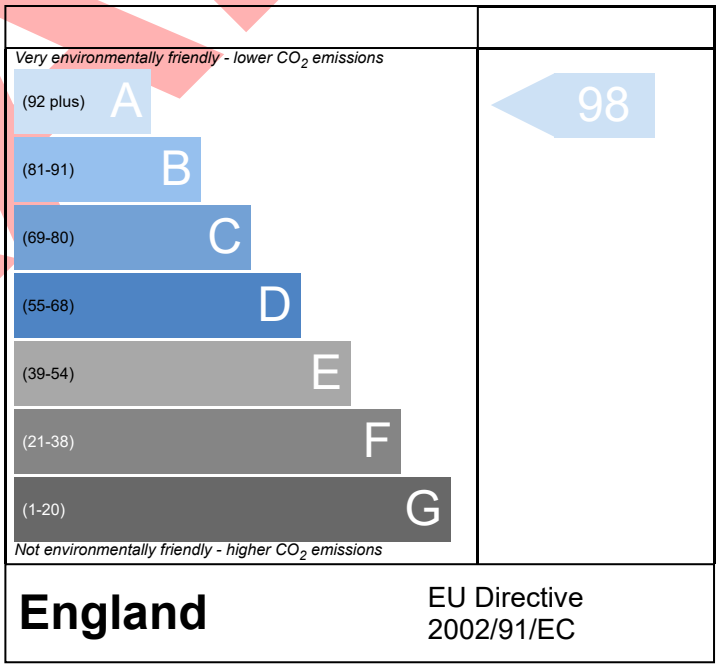
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

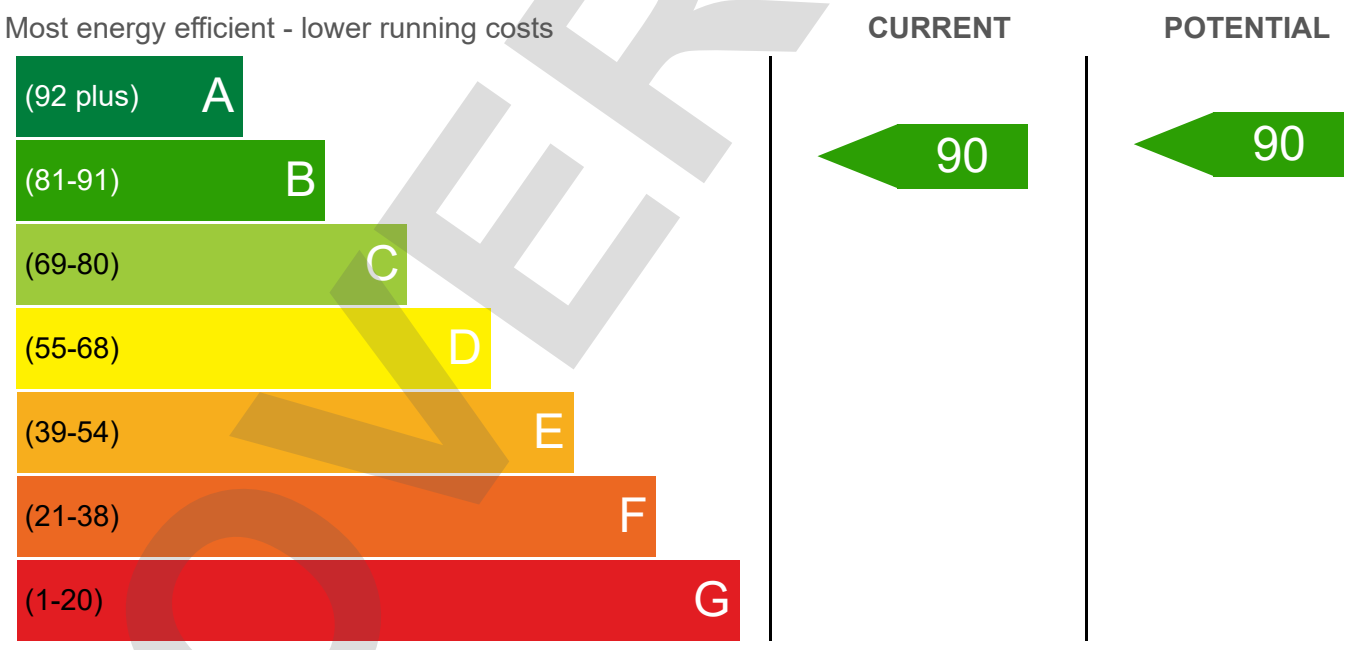
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Detached
Floor Area [m^2]	71

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators, electric	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 24 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.2** per year

With the recommended measures the potential CO emissions could be: **0** per year

Overview Report

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£206

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	27/04/2023
Date of certificate	27/04/2023
Type of assessment	SAP, new dwelling

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 05 May 2023 08:22:20

Project Information			
Assessed By	Keith Ketchley	Building Type	House, Mid-terrace
OCDEA Registration	EES/027679	Assessment Date	2023-05-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	80 m^2
Site Reference	Greggs Bakery	Plot Reference	Greggs-G-TH-Be Green
Address	D12 Gregs Bakery D12 - Townhouse, Twickenham		

Client Details	
Name	London Square
Company	London Square
Address	ONE YORK ROAD, , UXBRIDGE, UB8 1RN

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*9.5 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	2.32 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*49.62 kWh_{PE}/m^2*	
Dwelling primary energy	25.89 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*38.6 kWh/m^2*	
Dwelling fabric energy efficiency	34.0 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.15	Walls (1) (0.15)	OK
Party walls	*0.2*	0	Party Wall (1) (0)	**N/A**
Curtain walls	*1.6*	0	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor 1 (0.12)	OK
Roofs	*0.16*	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	*1.6*	1.3	Opening (1.3)	OK
Rooflights	*2.2*	1.3	Opening, North (1.3)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	34.77	0.15
Party wall: Party Wall (1)	32.5	0 **(!)**
Ground floor: Heatloss Floor 1, Heatloss Floor 1	57.09	0.12
Exposed roof: Roof (1)	71.2	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Opening, Opening Type 2	8.15	North	0.8	1.3
Opening, Opening Type 2	5.4	East	0.8	1.3
Door, Opening Type 1	2.53	East	N/A	1.3
Opening, Opening Type 3	5	North	0.7	1.3

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E5: Ground floor (normal)	Government-approved scheme	0 **(!)**	
External wall	E6: Intermediate floor within a dwelling	Government-approved scheme	0 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E18: Party wall between dwellings	Government-approved scheme	0 **(!)**	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	3 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	1	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	316.2%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Daikin Europe NV
Model	ERLQ008CAV3 + EHVH08SU26CB6W
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer, room thermostat and TRVs	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.55 W/(l/s)	OK
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	92%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		

9 Local generation	
Technology type: **Photovoltaic system (1)**	
Peak power	0.66 kWp
Orientation	South
Pitch	Horizontal
Overshading	None or very little
Manufacturer	
MCS certificate	

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

Property Reference	Greggs Bakery	**Issued on Date**	05/05/2023
Assessment Reference	Greggs-G-TH-Be Green	**Prop Type Ref**	Greggs Bakery
Property	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		

SAP Rating	90 B	**DER**	2.32	**TER**	9.50
Environmental	98 A	**% DER < TER**			75.58
CO_2 Emissions (t/year)	0.16	**DFEE**	33.97	**TFEE**	38.64
Compliance Check	See BREL	**% DFEE < TFEE**			12.10
% DPER < TPER	47.83	**DPER**	25.89	**TPER**	49.62

Assessor Details	Mr. Keith Ketchley	**Assessor ID**	Q303-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Unknown	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Which Floor	0	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m²K
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
Basement:	0.00 m	0.00 m²	0.00 m
Ground floor:	10.90 m	57.00 m²	2.50 m
1st Storey:	11.20 m	23.15 m²	2.50 m
2nd Storey:	12.70 m	31.00 m²	2.50 m
3rd Storey:	0.00 m	0.00 m²	0.00 m
4th Storey:	0.00 m	0.00 m²	0.00 m
5th Storey:	0.00 m	0.00 m²	0.00 m
6th Storey:	0.00 m	0.00 m²	0.00 m
7th Storey:	0.00 m	0.00 m²	0.00 m

8.0 Living Area	23.03	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	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	50.85	34.77	0.00	None	16.08	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	32.50	0.00	None

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	76.20	5.00	None	0.00	Enter Gross Area	5.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	+1	Plasterboard ceiling, carpeted chipboard floor	23.15

Summary for Input Data

elmhurst energy

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	57.09

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 2	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.80	1.30
Opening Type 3	Manufacturer	Roof Light	Triple Low-E Soft 0.05		Air Filled	0.57	Wood	0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Opening Type 2	External Wall 1	North	8.15	0
Opening	Opening Type 2	External Wall 1	East	5.40	0
Door	Opening Type 1	External Wall 1	East	2.53	0
Opening	Opening Type 3	External Roof 1	North	5.00	11

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Gov Approved Scheme	10.90	0.00	0.00	Yes
E6 Intermediate floor within a dwelling	Gov Approved Scheme	11.20	0.00	0.00	Yes
E18 Party wall between dwellings	Gov Approved Scheme	20.00	0.00	0.00	Yes

Y-value	0.00	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	
As Built AP_{50}	0.10	m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500167
Configuration	2
MVHR Duct Insulated	Insulated Ducts
Manufacturer SFP	0.55
Duct Type	Rigid
MVHR Efficiency	92.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	85.00	5	425	10

24.0 Main Heating 1	Database	
Description	Electric Heat Pumps	

Summary for Input Data

Percentage of Heat	100.00	%
Database Ref. No.	102672	
Fuel Type	Electricity	
SAP Code	0	
In Winter	0.00	
In Summer	0.00	
Model Name	ERLQ008CAV3 + EHVH08SU26CB6W	
Manufacturer	Daikin Europe NV	
System Type	Heat Pump	
Controls SAP Code	2210	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	
Boiler Interlock	No	
Combi boiler type	No 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	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		No	Storage System

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Internal Store	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	245.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	
31.0 Thermal Store	None	
32.0 Photovoltaic Unit	One Dwelling	
Export Capable Meter?	Yes	
Connected To Dwelling	Yes	
Diverter	No	
Battery Capacity [kWh]	0.00	

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.66	South	Horizontal	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

35.0 Special Features

Energy Saved	Fuel Saved	Energy Used	Fuel Used	Description	Monthly Air Change Rates	Special Technologies Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00		0.00				CO2 saving feature	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Predicted Energy Assessment

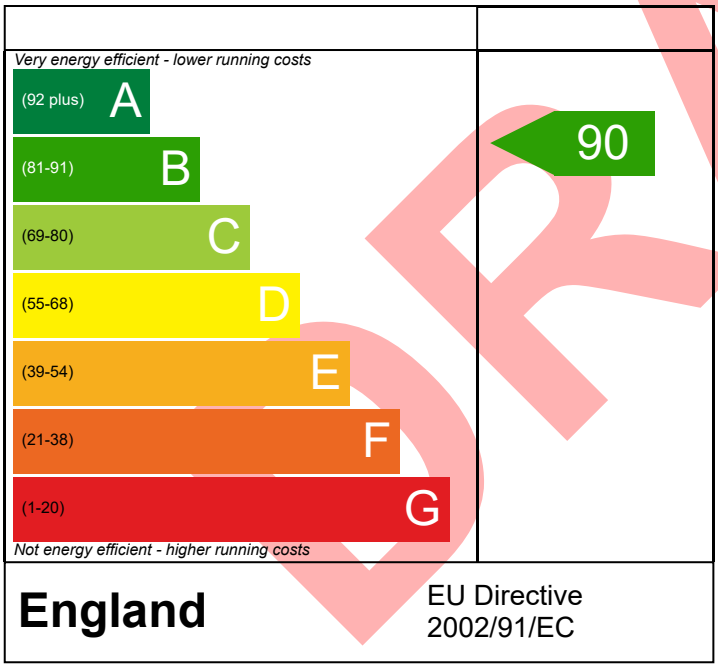
Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

Dwelling type:	House, Mid-Terrace
Date of assessment:	05/05/2023
Produced by:	Keith Ketchley
Total floor area:	80.15 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

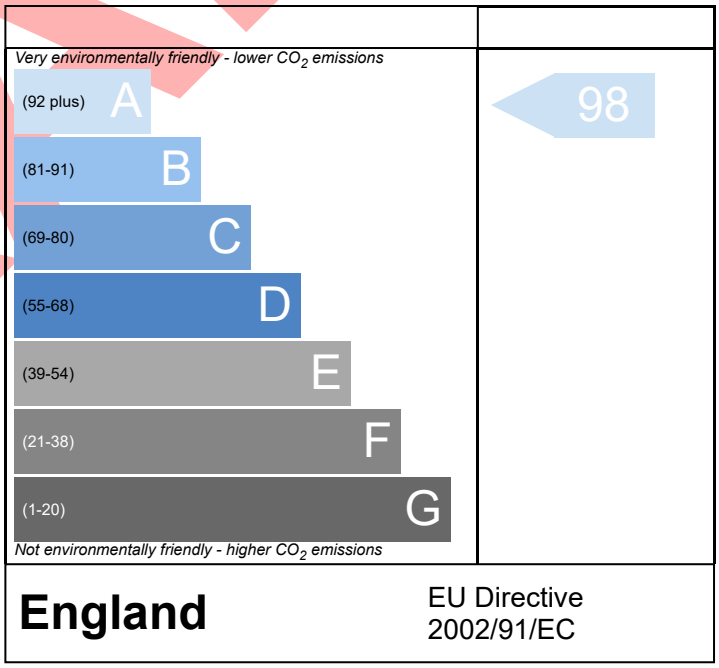
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

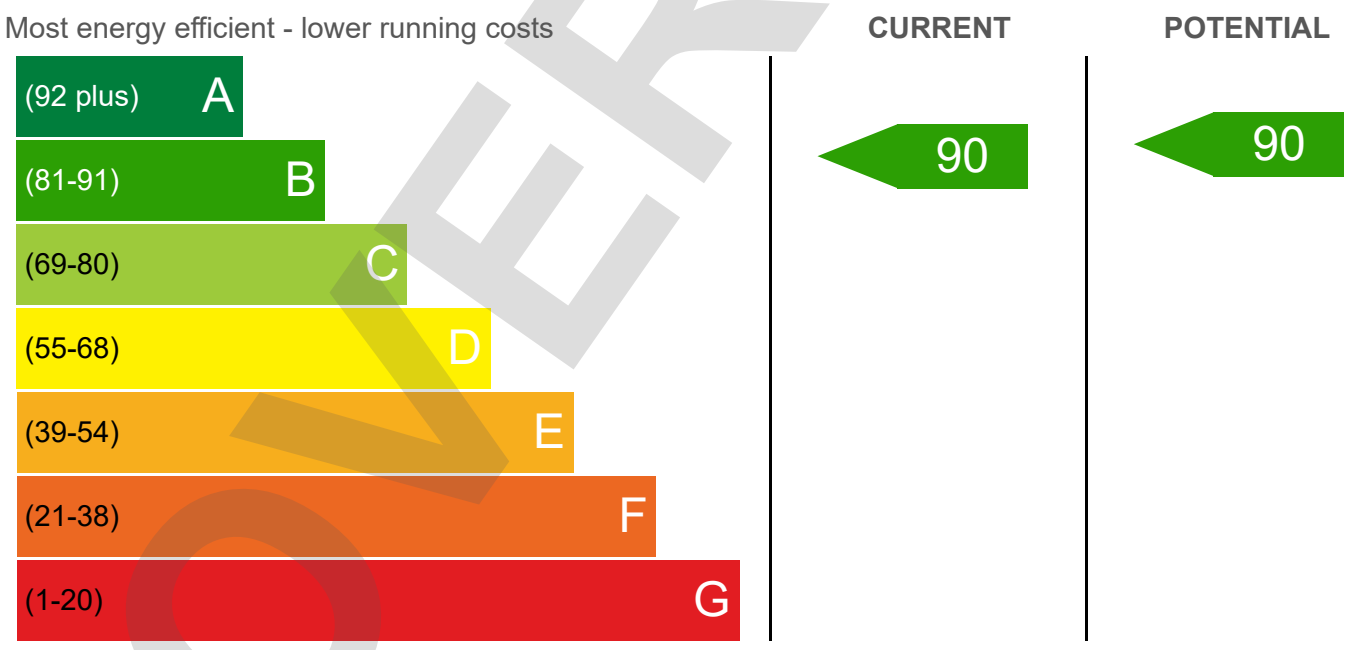
Overview Report

Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m^2]	80

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.



Overview Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.11 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators, electric	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 23 kilowatt hour (kWh) per square metre

Estimated CO_2 emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.2** per year

Overview Report

With the recommended measures the potential CO emissions could be: **0** per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£217

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Mr. Keith Ketchley
Assessor's accreditation number	EES/027679
Email Address	keith.ketchley@desco.uk.com

Overview Report

Accreditation scheme contact details	
Accreditation scheme	Elmhurst Energy Systems Ltd
Telephone	0191 522 2070
Email Address	keith.ketchley@desco.uk.com

Assessment details	
Related party disclosure	Employed by the professional dealing with the property transaction
Date of assessment	02/05/2023
Date of certificate	02/05/2023
Type of assessment	SAP, new dwelling

Appendix D – Be LEAN BRUKL report for industrial units

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Greggs Bakery Commerical Unit 1 - BE LEAN

As designed

Date: Fri May 05 13:01:06 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 324.95

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	3.49	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	2.9	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	36.63	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	30.88	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-Limit}}$	$U_{a\text{-Calc}}$	$U_{i\text{-Calc}}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000000:Surf[0]
Floors	0.18	0.12	0.12	ND000001:Surf[60]
Pitched roofs	0.16	0.15	0.15	ND000000:Surf[1]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000000:Surf[2]
Rooflights***	2.2	1.68	1.68	ND000001:Surf[0]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE LEAN - ASHP RADS

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.78	-	0	-	0.9
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 01 FF	-	-	-	1.6	-	-	-	-	-	-	N/A
Industrial Unit 01 GF	-	-	-	1.6	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 01 FF	NO
Industrial Unit 01 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Industrial Unit 01 FF	130	-	-
Industrial Unit 01 GF	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 01 FF	NO (-48.7%)	NO
Industrial Unit 01 GF	YES (+38%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	325	325
External area [m^2]	967.3	967.3
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	5
Average conductance [W/K]	221.48	302.71
Average U-value [W/m^2K]	0.23	0.31
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
13	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
87	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	3.87	8.61
Cooling	0	0
Auxiliary	7.32	4.7
Lighting	5.16	6.91
Hot water	4.31	4.09
Equipment*	32.16	32.16
TOTAL**	**20.66**	**24.31**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	38.73	86.11
Primary energy [kWh_{PE}/m^2]	30.88	36.63
Total emissions [kg/m^2]	2.9	3.49

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	38.7	0	3.9	0	7.3	2.78	0	2.78	0
	Notional	86.1	0	8.6	0	4.7	2.78	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Greggs Bakery Commerical Unit 2 - BE LEAN

As designed

Date: Thu Apr 27 15:17:44 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 324.95

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	3.49	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.9	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	36.63	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	30.88	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000000:Surf[0]
Floors	0.18	0.12	0.12	ND000001:Surf[60]
Pitched roofs	0.16	0.15	0.15	ND000000:Surf[1]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000000:Surf[2]
Rooflights***	2.2	1.68	1.68	ND000001:Surf[0]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE LEAN - ASHP RADS

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.78	-	0	-	0.9
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 01 FF	-	-	-	1.6	-	-	-	-	-	-	N/A
Industrial Unit 01 GF	-	-	-	1.6	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 01 FF	NO
Industrial Unit 01 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Industrial Unit 01 FF	130	-	-
Industrial Unit 01 GF	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 01 FF	NO (-48.7%)	NO
Industrial Unit 01 GF	YES (+38%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	325	325
External area [m²]	967.3	967.3
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	221.48	302.71
Average U-value [W/m²K]	0.23	0.31
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
13	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
87	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.87	8.61
Cooling	0	0
Auxiliary	7.32	4.7
Lighting	5.16	6.91
Hot water	4.31	4.09
Equipment*	32.16	32.16
TOTAL**	**20.66**	**24.31**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	38.73	86.11
Primary energy [kWh_{PE}/m²]	30.88	36.63
Total emissions [kg/m²]	2.9	3.49

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	38.7	0	3.9	0	7.3	2.78	0	2.78	0
	Notional	86.1	0	8.6	0	4.7	2.78	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Greggs Bakery Commerical Unit 3 - BE LEAN

As designed

Date: Fri May 05 12:56:42 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 151.59

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	3.29	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.89	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	34.58	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	30.73	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-Limit}}$	$U_{a\text{-Calc}}$	$U_{i\text{-Calc}}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000005:Surf[11]
Floors	0.18	0.12	0.12	ND000005:Surf[56]
Pitched roofs	0.16	0.15	0.15	ND000005:Surf[4]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000005:Surf[5]
Rooflights***	2.2	1.68	1.68	ND000005:Surf[0]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE LEAN - ASHP RADS

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.78	-	0	-	0.9
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 03 GF	-	-	-	1.6	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 03 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
Industrial Unit 03 GF	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 03 GF	YES (+87.8%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	151.6	151.6
External area [m²]	402.7	402.7
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	114.36	119.7
Average U-value [W/m²K]	0.28	0.3
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
100	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.56	6.06
Cooling	0	0
Auxiliary	7.23	4.68
Lighting	5.53	8.23
Hot water	4.24	4.03
Equipment*	29.87	29.87
TOTAL**	**20.55**	**23**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	35.6	60.62
Primary energy [kWh_{PE}/m²]	30.73	34.58
Total emissions [kg/m²]	2.89	3.29

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	35.6	0	3.6	0	7.2	2.78	0	2.78	0
	Notional	60.6	0	6.1	0	4.7	2.78	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Shell and Core

Greggs Bakery Commerical Unit 4 - BE LEAN

As designed

Date: Thu Apr 27 15:03:47 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m^2]: 196.98

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	3.55	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	2.95	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	37.18	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	31.35	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-Limit}}$	$U_{a\text{-Calc}}$	$U_{i\text{-Calc}}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000007:Surf[1]
Floors	0.18	0.12	0.12	ND000007:Surf[0]
Pitched roofs	0.16	0.15	0.15	ND000007:Surf[21]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000007:Surf[29]
Rooflights***	2.2	1.68	1.68	ND000007:Surf[15]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [$W/(m^2K)$]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE LEAN - ASHP RADS

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.78	-	0	-	0.9
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 04 GF	-	-	-	1.6	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 04 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Industrial Unit 04 GF	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 04 GF	YES (+72.7%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	197	197
External area [m²]	647.8	647.8
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	158.75	187.64
Average U-value [W/m²K]	0.25	0.29
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
100	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.31	8.36
Cooling	0	0
Auxiliary	7.23	4.68
Lighting	5.16	7.61
Hot water	4.24	4.03
Equipment*	29.87	29.87
TOTAL**	**20.94**	**24.68**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	43.13	83.63
Primary energy [kWh_{PE}/m²]	31.35	37.18
Total emissions [kg/m²]	2.95	3.55

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	43.1	0	4.3	0	7.2	2.78	0	2.78	0
	Notional	83.6	0	8.4	0	4.7	2.78	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Appendix E – Be GREEN BRUKL report for industrial units

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Greggs Bakery Commerical Unit 1 - BE GREEN

As designed

Date: Fri May 05 12:16:25 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 324.95

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	3.54	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	0.81	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	37.46	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	7.32	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000000:Surf[0]
Floors	0.18	0.12	0.12	ND000001:Surf[60]
Pitched roofs	0.16	0.15	0.15	ND000000:Surf[1]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000000:Surf[2]
Rooflights***	2.2	1.68	1.68	ND000001:Surf[0]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE CLEAN - VRF-ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4.5	0	-	0.9
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 01 FF	-	1.6	-	-	-	-	-	-	-	-	N/A
Industrial Unit 01 GF	-	1.6	-	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 01 FF	NO
Industrial Unit 01 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Industrial Unit 01 FF	130	-	-
Industrial Unit 01 GF	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 01 FF	NO (-48.7%)	NO
Industrial Unit 01 GF	YES (+38%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	325	325
External area [m²]	967.3	967.3
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	221.48	302.71
Average U-value [W/m²K]	0.23	0.31
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
13	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
87	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	2.7	8.63
Cooling	3.95	2.48
Auxiliary	5.44	2.91
Lighting	5.16	6.91
Hot water	4.31	4.09
Equipment*	32.16	32.16
TOTAL**	**21.55**	**25.01**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	16.76	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*16.76*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	102.94	127.61
Primary energy [kWh_{PE}/m^2]	7.32	37.46
Total emissions [kg/m²]	0.81	3.54

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	38.9	64.1	2.7	4	5.4	4	4.5	4	4.5
	Notional	86.3	41.3	8.6	2.5	2.9	2.78	4.63	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Greggs Bakery Commerical Unit 2 - BE GREEN

As designed

Date: Fri May 05 16:27:13 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 169.48

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	3.7	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	0.19	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	39.46	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	-1.13	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-Limit}}$	$U_{a\text{-Calc}}$	$U_{i\text{-Calc}}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000002:Surf[13]
Floors	0.18	0.12	0.12	ND000003:Surf[54]
Pitched roofs	0.16	0.15	0.15	ND000002:Surf[0]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000002:Surf[1]
Rooflights***	2.2	1.68	1.68	ND000003:Surf[0]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE CLEAN - VRF-ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4.5	0	-	0.9
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 02 FF	-	1.6	-	-	-	-	-	-	-	-	N/A
Industrial Unit 02 GF	-	1.6	-	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 02 FF	NO
Industrial Unit 02 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Industrial Unit 02 FF	130	-	-
Industrial Unit 02 GF	48	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 02 FF	YES (+11.3%)	NO
Industrial Unit 02 GF	YES (+86.9%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	169.5	169.5
External area [m²]	454.9	454.9
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	134.24	144.46
Average U-value [W/m²K]	0.3	0.32
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
100	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	2.84	7.43
Cooling	6.25	3
Auxiliary	5.11	2.7
Lighting	12.48	9.23
Hot water	4.29	4.07
Equipment*	32.42	32.42
TOTAL**	**30.97**	**26.43**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	32.13	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*32.13*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	142.13	124.38
Primary energy [kWh_{PE}/m²]	-1.13	39.46
Total emissions [kg/m²]	0.19	3.7

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	40.9	101.2	2.8	6.2	5.1	4	4.5	4	4.5
	Notional	74.4	50	7.4	3	2.7	2.78	4.63	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Greggs Bakery Commerical Unit 3 - BE GREEN

As designed

Date: Fri May 05 16:36:06 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 169.48

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$annum	3.63	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	-0.79	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	38.64	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	-11.38	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000004:Surf[13]
Floors	0.18	0.12	0.12	ND000005:Surf[56]
Pitched roofs	0.16	0.15	0.15	ND000004:Surf[0]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000004:Surf[1]
Rooflights***	2.2	1.68	1.68	ND000005:Surf[0]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE CLEAN - VRF-ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4.5	0	-	0.9
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 03 FF	-	1.6	-	-	-	-	-	-	-	-	N/A
Industrial Unit 03 GF	-	1.6	-	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 03 FF	NO
Industrial Unit 03 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Industrial Unit 03 FF	130	-	-
Industrial Unit 03 GF	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 03 FF	YES (+11.4%)	NO
Industrial Unit 03 GF	YES (+87.9%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	169.5	169.5
External area [m²]	454.9	454.9
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	135.23	144.45
Average U-value [W/m²K]	0.3	0.32
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
11	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
89	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.22	7.25
Cooling	5.81	2.79
Auxiliary	5.41	2.89
Lighting	5.42	8.86
Hot water	4.29	4.08
Equipment*	31.75	31.75
TOTAL**	**24.15**	**25.87**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	32.13	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*32.13*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	140.45	119.14
Primary energy [kWh_{PE}/m^2]	-11.38	38.64
Total emissions [kg/m²]	-0.79	3.63

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	46.3	94.1	3.2	5.8	5.4	4	4.5	4	4.5
	Notional	72.6	46.6	7.3	2.8	2.9	2.78	4.63	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Greggs Bakery Commerical Unit 4 - BE GREEN

As designed

Date: Fri May 05 16:39:19 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Name: Desco

Telephone number: 0191 522 2070

Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.20

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.20

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 222.44

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$annum	3.78	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	0.04	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	39.97	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	-1.91	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-Limit}}$	$U_{a\text{-Calc}}$	$U_{i\text{-Calc}}$	First surface with maximum value
Walls*	0.26	0.15	0.15	ND000006:Surf[0]
Floors	0.18	0.12	0.12	ND000007:Surf[0]
Pitched roofs	0.16	0.15	0.15	ND000006:Surf[1]
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.31	1.31	ND000006:Surf[2]
Rooflights***	2.2	1.68	1.68	ND000007:Surf[15]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)] $U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- BE CLEAN - VRF-ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4.5	0	-	0.9
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Industrial Unit 04 FF	-	1.6	-	-	-	-	-	-	-	-	N/A
Industrial Unit 04 GF	-	1.6	-	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 04 FF	NO
Industrial Unit 04 GF	NO

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Industrial Unit 04 FF	130	-	-
Industrial Unit 04 GF	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Industrial Unit 04 FF	NO (-31.8%)	NO
Industrial Unit 04 GF	YES (+47.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	222.4	222.4
External area [m²]	730	730
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	175.98	227.86
Average U-value [W/m²K]	0.24	0.31
Alpha value* [%]	9.95	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
11	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
89	**General Industrial and Special Industrial Groups**
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.41	9.76
Cooling	4.32	2.54
Auxiliary	5.42	2.89
Lighting	5.48	7.39
Hot water	4.3	4.08
Equipment*	31.91	31.91
TOTAL**	**22.92**	**26.66**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	24.48	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*24.48*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	119.05	139.95
Primary energy [kWh_{PE}/m²]	-1.91	39.97
Total emissions [kg/m²]	0.04	3.78

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	49.1	69.9	3.4	4.3	5.4	4	4.5	4	4.5
	Notional	97.6	42.4	9.8	2.5	2.9	2.78	4.63	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Appendix F – GLA Summary Tables

Part L 2021 Performance

Residential

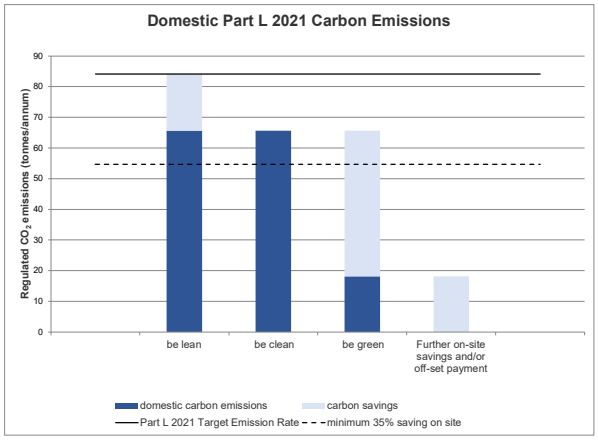
Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Comoliant Development	84.1	42.9
After energy demand reduction (be lean)	65.6	42.9
After heat network connection (be clean)	65.6	42.9
After renewable energy (be green)	18.2	42.9

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	18.5	22%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	47.4	56%
Cumulative on site savings	**65.9**	**78%**
Annual savings from off-set payment	18.2	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**546**	-
Cash in-lieu contribution (£)	**51,826**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab



Non-residential

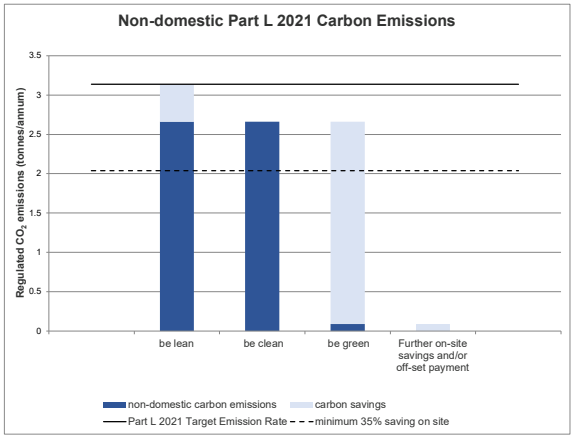
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Comoliant Development	3.1	5.6
After energy demand reduction (be lean)	2.7	5.6
After heat network connection (be clean)	2.7	5.6
After renewable energy (be green)	0.1	5.6

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	0.5	15%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	2.6	82%
Total Cumulative Savings	**3.0**	**97%**
Annual savings from off-set payment	0.1	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**3**	-
Cash in-lieu contribution (£)	**258**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab



SITE-WIDE

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2021 baseline	87.2		
Be lean	68.3	18.9	22%
Be clean	68.3	0.0	0%
Be green	18.3	50.0	57%
Total Savings	-	69.0	79%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**548.3**	-

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	54.90	26.12	52%

	Area weighted non-residential cooling demand (MJ/m^2)	Total non-residential cooling demand (MJ/year)
Actual	15.552	960.768
Notional	9.144	564.896

EUI & space heating demand (predicted energy use)

Residential

Building type	EUI (kWh/m²/year) (excluding renewable energy)	Space heating demand (kWh/m²/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m²/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m²/year) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)
Residential	32.76744267	11.5054199	35	15	Part L1 - SAP 10.2 & none dwellings / & none Landlord Circulation	

Non-residential

Building type	EUI (kWh/m²/year) (excluding renewable energy)	Space heating demand (kWh/m²/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m²/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m²/year) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)
All other non-residential	72.39106397	13.24585355	55	15	Part L2 - approved DSM & none	