

LONDON SQUARE DEVELOPMENTS LTD

FORMER GREGGS BAKERY SITE TWICKENHAM TW2 6RT

Energy Strategy and LZC Report Industrial-Led Scheme

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1	3 rd March 2022	Residential & Industrial Scheme
2	5 th 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	12 th May 2023	Wording amended

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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 CO₂ emissions and other energy targets and methods.
- To minimise and eradicated overheating in dwellings in line with CIBSE standards.
- \circ $\;$ 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.

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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 ·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.

	Carbon dioxide emissions (Tonnes CO2 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

Residential – SAP10

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

	Regulated carbon dioxide savings			
	(Tonnes CO₂ 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 CO2 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 (Nondomestic) 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 CO2 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 multifunctional 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

Revision: 07

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,
- \circ 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;
- \circ $\;$ 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.

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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.

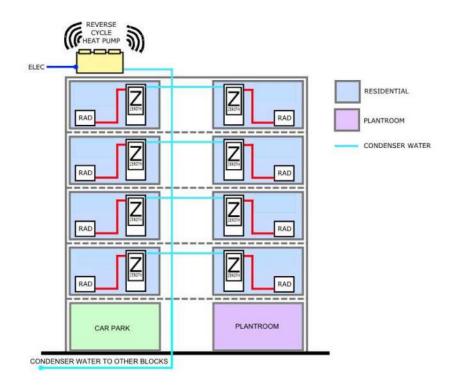


Figure 1 - Flat District Heating Philosophy

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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	Application	Feasibility
Type Wind	Roof mounted small scale wind turbines for domestic and non	Visual electromagnetic and environmental noise impact, and public opposition to such, may have
Turbine Power	domestic buildings. Wind speeds of 7m/s or above required for large scale therefore high level mounting only option.	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 CO₂ 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	-	
Tonn	es 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 CO₂ 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 (Nondomestic) 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)

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 \pounds 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**

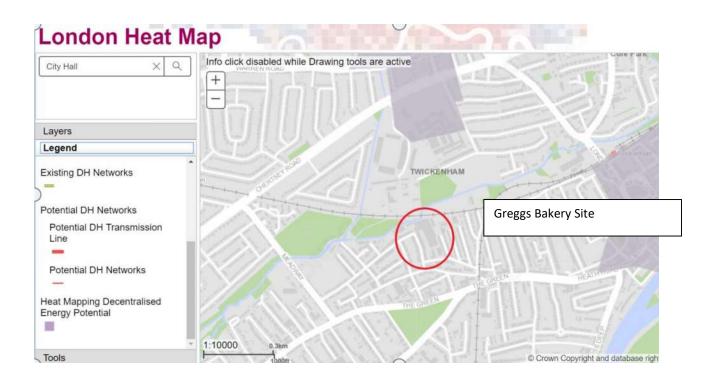
The above calculations are based on pre planning stage 2 apartment layouts and are therefore estimates. Figures will need to be refined as the design progresses and when final design stage SAP calculations are submitted during RIBA design stage 4.

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

 Ref:
 1823-50-RPT-09

 Date:
 9th May 2023

 Revision:
 07

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	rgy 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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK				
and roof windows								
Rooflights	2.2	N/A	N/A	N/A				

Name		Net area [m ²]	U-Value [W/m ² K]		
Exposed wall: W	/alls (1)			29.7	0.15
2c Openings (b	etter than typicall	y expected value	s are flagged with a sub	osequent (!))	
Name		Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, Openi	ng Type 2	2.5	East	0.8	1.3
Opening, Openi	ng Type 2	2.5	East	0.8	1.3
Patio Door, Ope	ning Type 2	5.6	East	0.8	1.3
Opening, Openi	ng Type 2	3.6	West	0.8	1.3
Front Door, Opening Type 1		2	North	N/A	1.3
2d Thermal brid	dging (better than	typically expecte	ed values are flagged wi	th a subsequent (!))	
			culated from linear therm		ach junction
Main element	Junction detail	00	Source	Psi value	Drawing /
				[\A//mal/]	reference

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E7: Party floor between dwellings	Government-approved scheme	0 (!)	Telefence
	(in blocks of flats)			
External wall	E16: Corner (normal)	Government-approved scheme	0 (!)	

3 Air permeability (better than typical	vernected	values are flagged with a subsequent	
Maximum permitted air permeability at 5		8 m ³ /hm ²	(4))
Dwelling air permeability at 50Pa	ога	3 m ³ /hm ² , Design value (!)	OK
Air permeability test certificate reference			OK
· · · ·		1	
4 Space heating			
Main heating system 1: Boiler with radi		erfloor 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	1		
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: Instan	taneous	
Efficiency	0.0%		
Manufacturer	Hei-tech b	.V.	
Model	Recoh-ver	t RV3	
6 Controls			
Main heating 1 - type: Programmer, roo	m thermosta	at and TRVs	
Function			
Ecodesign class			
Manufacturer			
Model			
Water heating - type: N/A			
Manufacturer			
Model			
	•		
7 Lighting	75 1 441		
Minimum permitted light source efficacy	75 lm/W		014
Lowest light source efficacy	85 lm/W		OK
External lights control	N/A		
8 Mechanical ventilation			
System type: Balanced whole-house ma	echanical ve	entilation with heat recovery	
Maximum permitted specific fan power	1.5 W/(I/s)		
Specific fan power	0.55 W/(I/s		OK
Minimum permitted heat recovery	73%		
Minimum permitted heat recovery efficiency	73%		
efficiency Heat recovery efficiency	92%		ОК
efficiency	92%	inetic Plus B	ОК
efficiency Heat recovery efficiency	92%	inetic Plus B	ОК
efficiency Heat recovery efficiency Manufacturer/Model Commissioning	92%	inetic Plus B	ОК
efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation	92% Sentinel Ki	inetic Plus B	ОК
efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system	92% Sentinel K	inetic Plus B	ОК
efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power	92% Sentinel Ki (1) 1.47 kWp		ОК
efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power Orientation	92% Sentinel Ki (1) 1.47 kWp South Eas		ОК
efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power Orientation Pitch	92% Sentinel Ki (1) 1.47 kWp South Eas Horizontal	t	<u>ОК</u>
efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power Orientation Pitch Overshading	92% Sentinel Ki (1) 1.47 kWp South Eas	t	OK
efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power Orientation Pitch	92% Sentinel Ki (1) 1.47 kWp South Eas Horizontal	t	OK

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							



Property Reference		Greggs I	Bakery						Issued	on Date	05/05	/2023	
Assessment Reference		Greggs-/	A-2B4P-Be Lear	1		Prop 1	Type R	ef	Greggs Bakery				
Property		Gregs B	akery D12 - Tow	nhouse, D12, Twicke	nham, Thai	nes Valley	/						
CAD Dating					DER		7.00			ED	40	00	
SAP Rating Environmental				93 A	% DER		7.89			TER		.36	
				94 A	% DER	< IER	20.40	<u>`</u>		FEE		.84	
CO ₂ Emissions (t/year)				0.53		E < TFEE	20.40)		IFEE		.45	
Compliance Check				See BREL			40.00	<u>,</u>		DED		.00	
% DPER < TPER				21.30	DPER		42.66)		TPER	54	.20	
Assessor Details	Mr. K	Keith Ket	chley							Assessoi	r ID Q	303-00	01
Client													
SUMMARY FOR INPL	JT DATA	A FOR:	New Build (As Designed)									
Drientation				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									
8.0 Date Built				2023									
I.0 Sheltered Sides				2									
5.0 Sunlight/Shade				Average or unknow	n								
6.0 Thermal Mass Parame	ter			Precise calculation									
Thermal Mass				N/A					k.	J/m²K			
7.0 Electricity Tariff				Standard									
Smart electricity meter f	itted			Yes									
Smart gas meter fitted				Yes									
7.0 Measurements				Baseme Ground flo 1st Stor 2nd Stor 3rd Stor 4th Stor 5th Stor 6th Stor 7th Stor	nt: or: ey: ey: ey: ey: ey: ey:	Loss Peri 0.00 m 27.00 m 12.70 m 0.00 m 0.00 m 0.00 m 0.00 m 0.00 m		Inf	ternal Flo 0.00 m 72.00 r 54.00 r 31.00 r 0.00 m 0.00 m 0.00 m 0.00 m 0.00 m	1 ² 11 ² 11 ² 1 ² 1 ² 1 ² 1 ² 1 ²		Store 0.00 n 2.50 n 2.50 n 2.50 n 0.00 n 0.00 n 0.00 n 0.00 n 0.00 n	1 1 1 1 1 1 1 1
8.0 Living Area				25.00	-				m	2			
9.0 External Walls													
Description	Туре	C	Construction		U-Value (W/m ² K)	Kappa ((kJ/m²K) Ar		Nett Area (m²)	Shelter Res	Shelter	Opening	s Area	Calculatio Type
External Wall 1	Cavity Wa		Cavity wall : plasterb illed cavity, any outs	oard on dabs, AAC block, ide structure	0.15		45.90	29.70	0.00	None	16.20	Enter	Gross Are
9.1 Party Walls			<u> </u>										
Description	Тур	e	Construc	ction					Kappa	Area	Shelter	Sh	elter
Party Wall 1		d Cavity e Sealing		ard on dabs mounted C blocks, cavity	l on cemen	t render or			(kJ/m²K) 45.00	(m²) 55.65	Res 0.00	N	one
9.2 Internal Walls Description			Construct	ion							Kaj	ра	Area (m
Internal Wall 1	Dense block, plasterboard on dabs							(kJ/r 75	n ^² K)	43.22			
I0.1 Party Ceilings Description			Construct								Ka		Area (m
Description			Construct								Kap (kJ/r		Area (f



Party Ceiling 1		In-situ (concrete slab supported by profiled metal d	eck, carpete	ed			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	Туре	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1 Opening Type 2	Manufacturer Manufacturer	Solid Door Window	Double Low-E Soft 0.05 Double Low-E Soft 0.05		Air Filled Air Filled	0.63 0.63	Wood Wood	0.80 0.80	1.30 1.30
13.0 Openings									
Name Opening	Opening Ty Opening Typ	pe pe 2	Location External Wall 1	Orient Eas		Area (2.5			t ch D
Opening Patio Door	Opening Typ Opening Typ	be 2	External Wall 1 External Wall 1	Ea: Ea:		2.5 5.6			D D
Opening	Opening Typ	be 2	External Wall 1	We	st	3.6	0		D
Front Door	Opening Typ	pe 1	External Wall 1	Nor	th	2.0	0		0
14.0 Conservatory			None						
15.0 Draught Proofing			100			%			
16.0 Draught Lobby			No						
			Calaulata Dridra						
17.0 Thermal Bridging 17.1 List of Bridges			Calculate Bridges						
Bridge Type			Source Type Length	Psi		Reference	:		Imported
E7 Party floor between dy E16 Corner (normal)	wellings (in block	s of flats)	Gov Approved Scheme27.00Gov Approved Scheme10.00	0.00 0.00	0.00 0.00				Yes Yes
Y-value			0.00			W/m²K			
8.0 Pressure Testing			Yes						
Designed AP ₅₀			3.00			 	²) @ 50 Pa		
-			Yes) @ 30 Fa	I	
Property Tested?									
Test Method			Blower Door]	2) O 50 D-		
As Built AP ₅₀			0.10				²) @ 50 Pa		
19.0 Mechanical Ventilation Mechanical Ventilation	ı								
Mechanical Ventilation	tion System Pres	ent	Yes			7			
Approved Installation	•		No			Ì			
Mechanical Ventilat			Database						
Туре			Balanced mechanical ventilation with	heat recove	rv				
MV Reference Num	her		500167		.,				
Configuration			2						
-	od		Insulated Ducts						
MVHR Duct Insulat	eu								
Manufacturer SFP			0.55						
Duct Type			Rigid						
MVHR Efficiency			92.00						
Wet Rooms			2						
SFP from Installer (U U	Certificate	No			_			
MVHR System Loc			Inside heated envelope (installed exc	lusively)					
Duct Installation Sp	ecification		Level 1						
20.0 Fans, Open Fireplaces	s, Flues								
21.0 Fixed Cooling System			No						
22.0 Lighting									
No Fixed Lighting			No						
No Pixou Eighting			Name Efficacy		wer	Capa	• •	-	unt



4.0 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 Туре	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	
5.0 Main Heating 2	None	

26.0 Heat Networks

None

	Heat Source	Fuel Type Heating Use	e 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	I								

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		
28.1 Showers			
Description Shower Type		Flow Rate Rated Power C [I/min] [kW]	Connected Connected To
Shower Vented hot wa	ter system	7.00	No Storage System
28.3 Waste Water Heat Recovery System Instantaneous System 1			
Database ID	80003		1
Brand Model	Showersave, Recoh-vert RV3		
Details	Year: 2011 + 2017 Efficiency: 0	Utilisation factor: 0.974	
29.0 Hot Water Cylinder	None		<u></u>
Cylinder Stat	No		
Cylinder In Heated Space	No		
	No		
Insulation Type	Measured Loss		
	245.00		
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 Over Factor	shading MCS Panel or Certificate Manufacturer
1.47 South East Horizontal	None Or Little No	No 1.00	Reference
34.0 Small-scale Hydro	None		
Electricity Generated	0.00		
	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 Fuel Saved Energy Fuel Used Descrij Saved Used	ption Monthly Air Change Rates Te	Special Jan Feb Mar A echnologies Type	Apr May Jun Jul Aug Sep Oct Nov Dec
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

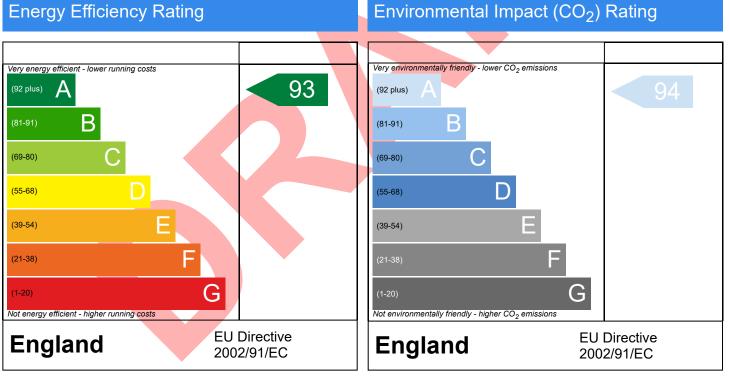


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

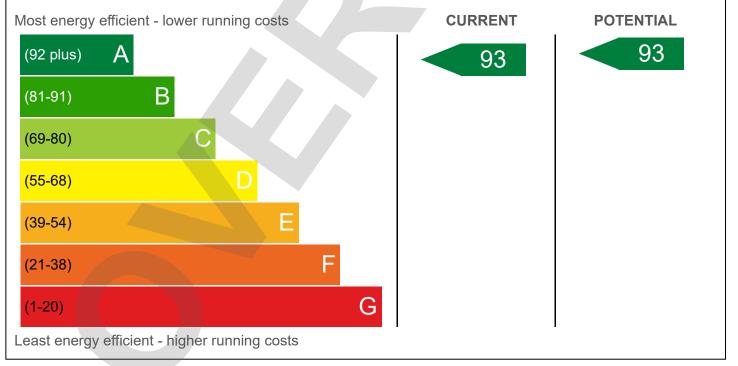


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		
Report Date	05/05/2023		
Property Type	Flat, Detached		
Floor Area [m ²]	72		

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.





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 transmi	ttance 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 CO₂ 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 CC	emissions	s 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 measureTypical Yearly SavingPotential Rating after measure installedCumulative savings (per year)Cumulative Potential Rating
--

Estimated energy use and potential savings



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		



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 ene								
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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK					
and roof windows									
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 ² K]							
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 ² K]					
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					

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
Party wall			SAP table default	0 (!)	
Party wall	dwelling P5: Roof (insulation at	rafter level)	SAP table default	0.48	
-	X .	,			
	tted air permeability at 5		values are flagged with a 8 m ³ /hm ²	subsequent (!))	
	neability at 50Pa	ura	3 m ³ /hm ² , Design value (!	<u>)</u>	OK
	test certificate reference)	UK
			·		
4 Space heating Main heating sy		ators or und	erfloor heating - Mains gas		
Efficiency	Stem 1. Doner with radio	89.1%	emoti neating mains gas		
Emitter type		Radiators			
Flow temperatur	e	45°C			
System type	•	Notional S	Dec		
Manufacturer		Notional S			
Model		Notional S			
Commissioning			1		
	ting system: N/A	1			
Fuel		N/A			
Efficiency		N/A			
Commissioning					
5 Hot water		•			
Cylinder/store -	tupo: NI/A				
Capacity	· type. N/A	N/A			
		N/A N/A			
Declared heat loss N/A Primary pipework insulated N/A					
Manufacturer	K IIISulaleu	IN/A			
Model					
Commissioning					
	at recovery system 1 -	tvpe: Instan	taneous		
Efficiency		0.0%			
Manufacturer		Hei-tech b	V.		
Model		Recoh-ver			
6 Controls			at and TDV/a		
Function	- type: Programmer, roo		al, allu IRVS		
Ecodesign class					
Manufacturer					
Model					
Water heating -	type: N/A	I			
Manufacturer					
Model					
		1			
7 Lighting	te di lieda ta ava anti	75 1. 441			
	ted light source efficacy	75 lm/W			
Lowest light sou		85 lm/W			OK
External lights co	ontrol	N/A			
8 Mechanical ve	entilation				
		echanical ve	entilation with heat recovery		
	tted specific fan power	1.5 W/(I/s)			
Specific fan pow	er	0.55 W/(I/s			ОК
	ted heat recovery	73%			•
efficiency					
Heat recovery ef	fficiency	92%			OK
Manufacturer/Mo		Sentinel K	inetic Plus B		
Commissioning					
		-			

9 Local generation								
Technology type: Photovoltaic system (1)								
eak power 2.52 kWp								
Orientation	South East							
Pitch	30°							
Overshading	None or very little							
Manufacturer								
MCS certificate								
10 Heat networks								
N/A								
N/A								
11 Supporting documentary evidence								
N/A								
12 Declarations								
a. Assessor Declaration								
	nfirmation that the as	ntents of this BREL Compliance Report						
		formation submitted for this dwelling for						
the purpose of carrying out the "As de								
evidence (SAP Conventions, Appendi								
documentary evidence required) has t	been reviewed in the	course of preparing this BREL						
Compliance Report.								
Circa e di								
Signed:		Assessor ID:						
Name:	Name: Date:							
b. Client Declaration								
N/A								
IN/A								



Property Reference	Gree	ggs Bakery						Issu	ed on Dat	e 05	05/2023	
Assessment Reference	Gree	ggs-C-TH-Be Lean			Prop	Туре	Ref	Gregg	reggs Bakery			
Property	Gree	gs Bakery D12 - Tov	vnhouse, D12, Twicker	nham, Tha	mes Valle	ey.						
				252			_		750			
SAP Rating			94 A	DER		7.52	2		TER		8.44	
Environmental			93 A		< TER						10.90	
			0.79	DFEE		31.6	50		TFEE		27.37	
			See BREL		E < TFEE						-15.47	
% DPER < TPER			7.34	DPER		40.6	64		TPER		43.86	
Assessor Details	Mr. Keith	Ketchley							Assess	or ID	Q303-00	01
Client												
SUMMARY FOR INPL	JT DATA FO	OR: New Build (As Designed)									
Drientation			Unknown									
Property Tenture			ND									
			6									
Fransaction Type Ferrain Type			8 Suburban									
I.0 Property Type			House, Mid-Terrace									
Which Floor			0									
2.0 Number of Storeys			3									
3.0 Date Built			2023									
I.0 Sheltered Sides			0									
5.0 Sunlight/Shade			Average or unknow									
5.0 Thermal Mass Parame	tor		Precise calculation									
Thermal Mass Parame	eter		N/A					kJ/m²K				
			IN/A						NJ/III N			
7.0 Electricity Tariff			Standard									
Smart electricity meter	fitted		Yes									
Smart gas meter fitted			Yes									
7.0 Measurements												
			Baseme		Loss Pe : 0.00 m		er Int	ternal F 0.00	loor Area) m²	Avera	ge Store 0.00 m	
			Ground flo 1st Store		23.87 n 23.87 n			41.0 54.0			2.50 m 2.50 m	
			2nd Store	ey:	12.70 n	n		31.0	0 m²		2.50 m	
			3rd Store 4th Store		0.00 m 0.00 m			0.00 0.00			0.00 m 0.00 m	
			5th Store 6th Store		0.00 m 0.00 m			0.00			0.00 m 0.00 m	
			7th Store		0.00 m			0.00			0.00 m	
3.0 Living Area			20.50						m²			
9.0 External Walls												
Description	Туре	Construction					Nett Area		Shelte	r Open	ngs Area (
External Wall 1	Cavity Wall	Cavity wall : plaster filled cavity, any out	ooard on dabs, AAC block,	(W/m²K) 0.15	(kJ/m²K) A 60.00	Area(m ² 50.85) (m²) 25.53	Res 0.00	None	25.		Type Gross Are
9.1 Party Walls		mica cavity, any out										
Description	Туре	Constru	ction				U-Value			Shelter	Sh	elter
Party Wall 1		avity with Plasterb	pard on dabs mounted	on cemer	nt render o	on hoth	(W/m²K)		(m ²)	Res	N	one
	Edge Se		AC blocks, cavity					+0.00		. 0.00		
10.0 External Roofs						_	_					_
Description	Туре	Constructio	n	U (V	-Value K V/m²K)(k.	appa J/m²K)	Gross Area(m²)	Nett Area		Shelter Ca Factor	lculation Type	Openin
External Roof 1	External FI Roof	at Plasterboard	, insulated flat roof	(-		9.00	24.10	(m²) 0.00	None		ter Gross Area	0.00
0.2 Internal Ceilings												
Description		Storey +1	Construction Plasterboard ceilir	a cornet	ad chinh-	ard fla	or				Area	(m²) .80
internal Celling I		• •	i iasterbudiu telli	ig, carpet	sa cuihnos	uru 110					40	



11.0 Heat Loss Floors Description	Туре	Storey Index	Construction		U-Val	lue s	Shelter Code	She	elter Kap	ba Area (m²
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete	e floor, carpeted	(W/m 0.1:		None		ctor (kJ/m 00 75.0	
12.0 Opening Types Description	Data Source	Туре	Glazing		Glazing	Filling	G-value	Frame	Frame	U Value
Opening Type 1 Opening Type 2	Manufacturer Manufacturer	Half Glazed Window		v-E Soft 0.05 v-E Soft 0.05	Gap	Type Air Filled Air Filled	0.63 0.63	Type Wood Wood	Factor 0.80 0.80	(W/m²K) 1.30 1.30
13.0 Openings Name Opening Opening Door	Opening Ty Opening Typ Opening Typ Opening Typ	be 2 be 2	Location External Wall 1 External Wall 1 External Wall 1		Orient We Ea: Ea:	st st	Area (14.8 7.90 2.53	9 0		tch 0 0 0
14.0 Conservatory			None							
15.0 Draught Proofing			100				 %			
16.0 Draught Lobby			No				j			
17.0 Thermal Bridging 17.1 List of Bridges			Calculate Bridges	5						
Bridge Type E5 Ground floor (normal) E6 Intermediate floor with E18 Party wall between of P3 Party wall - Intermedi (in blocks of flats) P2 Party wall - Intermedi P5 Party wall - Roof (ins)	hin a dwelling dwellings ate floor between ate floor within a	Ta Ta Ta dwellings Ta dwelling Ta	ource Type able K1 - Default able K1 - Default	Length 8.59 25.40 30.00 19.20 33.00 12.60	Psi 0.32 0.14 0.24 0.00 0.00 0.48	Adjusted 0.32 0.14 0.24 0.00 0.00 0.48	Reference:			Imported Yes Yes Yes No No No
Y-value		,	0.17				W/m²K			
18.0 Pressure Testing			Yes				7			
Designed AP ₅₀			3.00				 m³/(h.m	²) @ 50 Pa	a	
Property Tested?			Yes				Ī			
Test Method			Blower Door				7			
As Built AP 50			0.10				m³/(h.m	²) @ 50 Pa	a	
19.0 Mechanical Ventilation	ı									
Mechanical Ventilation							_			
Mechanical Ventila	•	ent	Yes							
Approved Installation			No							
Mechanical Ventila	tion data Type		Database							
Туре				nical ventilation with h	eat recove	ery				
MV Reference Nun	nber		500167							
Configuration			2							
MVHR Duct Insulat	ed		Insulated Ducts							
Manufacturer SFP			0.55							
Duct Type			Rigid							
MVHR Efficiency			92.00							
Wet Rooms			2							
SFP from Installer	Commissioning C	Certificate	No							
MVHR System Loc	ation		Inside heated en	velope (installed exclu	isively)					
Duct Installation Sp	pecification		Level 1							
20.0 Fans, Open Fireplaces										
21.0 Fixed Cooling System			No							
22.0 Lighting No Fixed Lighting			No							
			Name Lighting 1	Efficacy 85.00		5	Capa 42			bunt 10



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

	Heat Source	Fuel Type Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1 Heat source 2 Heat source 3 Heat source 4 Heat source 5	None None None None 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



28.1 Showers Description Shower Type Flow Rate Rated Power Connected Connected To [l/min] [kW] Shower Vented hot water system Storage System 7.00 No 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 No Cylinder Stat Cylinder In Heated Space No No Independent Time Control Insulation Type Measured Loss 245.00 Cylinder Volume L 1.92 kWh/day Loss No In Airing Cupboard 31.0 Thermal Store None 32.0 Photovoltaic Unit One Dwelling Export Capable Meter? Yes Connected To Dwelling Yes No Diverter Battery Capacity [kWh] 0.00 PV Cells kWp Overshading FGHRS MCS Certificate Orientation Elevation Overshading MCS Panel Manufacturer Factor Certificate Reference 2.52 South East 30° None Or Little No 1.00 No None 34.0 Small-scale Hydro **Electricity Generated** 0.00 Apportioned 0.00 kWh/Year Connected to dwelling's electricity meter Yes Annual **Electricity Generation** Feb May Jan Mar Apr Jun Jul Aug Sep Oct Nov Dec 35.0 Special Features Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Energy Fuel Saved Energy Fuel Used Description Monthly Air Special Change Rates Saved Used Technologies Type CO2 saving 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 feature

Recommendations

Lower cost measures

None Further measures to achieve even higher standards None

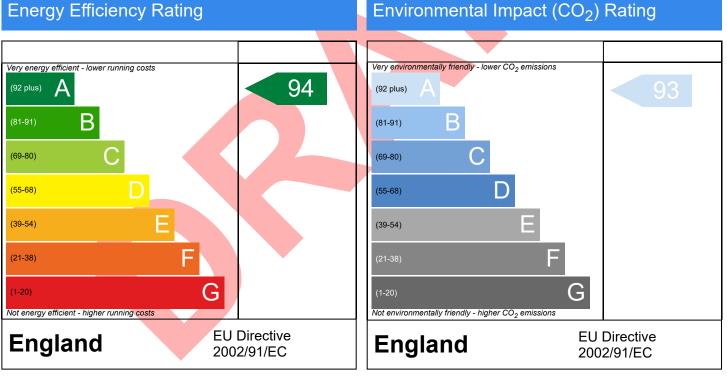


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

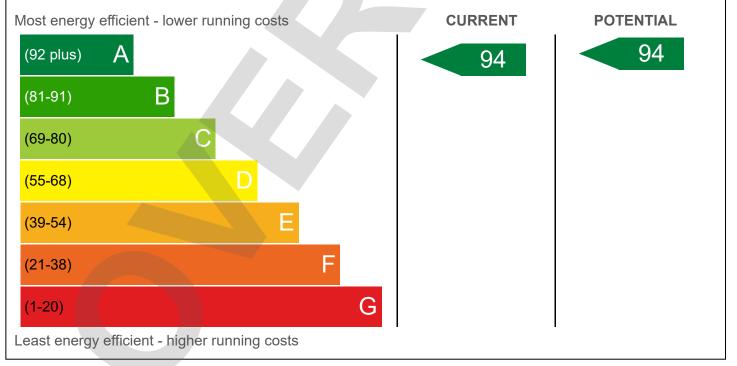


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		
Report Date	05/05/2023		
Property Type	House, Mid-Terrace		
Floor Area [m ²]	126		

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.





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 transmit	ttance 0.15 W/m²K		Very Good
Roof	Average thermal transmit	ttance 0.11 W/m²K		Very Good
Floor	Average thermal transmit	ttance 0.12 W/m²K		Very Good
Windows	High performance glazine	g		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 CO₂ 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.

0.8

The	estimated	CO	emissions	for	this	dwellings	is:
-----	-----------	----	-----------	-----	------	-----------	-----

per year



With the recommended measures the potential CO emissions could be:

per year

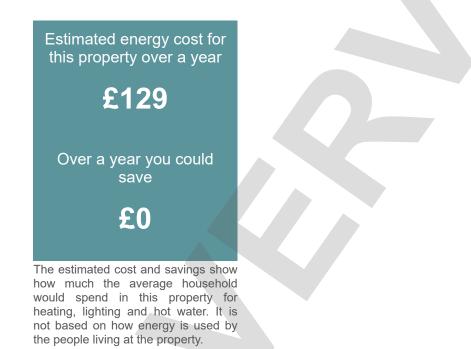
1

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

Estimated energy use and potential savings



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		

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	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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK							
and roof windows											
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 ² K]								
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	Frame factor	U-Value [W/m ² K]								
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						

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				
Party wall	dwellings (in blocks of P2: Intermediate floor v dwelling		SAP table default	0 (!)					
Party wall	P5: Roof (insulation at	rafter level)	SAP table default						
3 Air permeabil	ity (better than typical)	v expected	values are flagged with a	a subsequent (!))					
	tted air permeability at 5		8 m ³ /hm ²						
Dwelling air pern			3 m ³ /hm ² , Design value ((!)	OK				
	est certificate reference		1						
4 Space heating	1								
		ators or und	erfloor heating - Mains gas						
Efficiency		89.1%							
Emitter type		Radiators							
Flow temperature	е	35°C							
System type		Notional							
Manufacturer		Notional							
Model		Notional							
Commissioning									
	ing system: N/A	•							
Fuel		N/A							
Efficiency		N/A							
Commissioning									
5 Hot water									
Cylinder/store -	type: N/A								
Capacity	type. N/A	N/A							
Declared heat lo	<u> </u>	N/A							
Primary pipewor		N/A							
Manufacturer	K IIISulateu	IN/A							
Model									
Commissioning									
	at recovery system 1 -	tvpe: Instan	taneous						
Efficiency		0.0%							
Manufacturer		Hei-tech b.	V.						
Model		Recoh-ver							
6 Controls	·	4 4							
	- type: Programmer, rooi	m thermosta	at, and IRVS						
Function									
Ecodesign class									
Manufacturer Model									
	type: Cylinder thermosta	L at and H\M o	enarately timed						
Manufacturer	type. Cymuer thermosta		eparately lilleu						
Model									
		I							
7 Lighting									
	ted light source efficacy	75 lm/W							
Lowest light sour		85 lm/W			OK				
External lights co	ontrol	N/A							
8 Mechanical ve	entilation								
		echanical ve	entilation with heat recovery	1					
	tted specific fan power	1.5 W/(I/s)							
Specific fan pow		0.55 W/(l/s	3)		OK				
	ted heat recovery	73%	,						
efficiency	,								
Heat recovery ef	ficiency	92%			ОК				
Manufacturer/Mo			inetic Plus B						
Commissioning									
5									

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:		Assessor ID:								
Name:		Date:								
b. Client Declaration										
N/A										



Property Reference	Gre	eggs Baker	y							lssu	ed on Dat	te	05/05/	2023	
Assessment Reference	Gre	eggs-D-TH-	Be Lean				Pro	р Туре	Ref	Grego	Greggs Bakery				
Property	Gre	egs Bakery	D12 - Town	nhouse, D1	12, Twickenl	nam, Tha	ames Val	ley							
CAD Doting				00.4		DED					TED		0.7	•	
SAP Rating				92 A				8.6	4		TER		8.7		
Environmental				92 A			R < TER	00			TEEE		0.6		
CO ₂ Emissions (t/year)				0.95		DFEE		32.	87		TFEE		29.		
Compliance Check				See BRE	L		E < TFE				TDED		-13		
% DPER < TPER				-3.79		DPER		46.	98		TPER		45.	26	
Assessor Details	Mr. Keit	h Ketchley									Assess	or ID	Q3	03-0001	1
Client															
SUMMARY FOR INPU	T DATA F	OR: New	Build (A	s Desig	ned)										
Orientation				Unknown											
Property Tenture				ND											
Transaction Type				6											
Terrain Type				Suburbar	1										
1.0 Property Type					lid-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 Paramet	er				alculation										
Thermal Mass				N/A							kJ/m²K				
7.0 Electricity Tariff				Standard											
Smart electricity meter fi	tted			Yes											
Smart gas meter fitted				Yes											
7.0 Measurements				G	Basemen iround floo 1st Store 2nd Store 3rd Store 4th Store 5th Store 6th Store 7th Store	t: r: y: y: y: y: y: y:	t Loss P 0.00 r 8.59 r 12.70 12.70 0.00 r 0.00 r 0.00 r 0.00 r	ກ m m ກ ກ ກ	ər Int	0.00 41.0 54.0 31.0 0.00 0.00 0.00	Floor Area) m ² 0 m ² 0 m ² 0 m ²) m ²	Av		Storey 0.00 m 2.50 m 2.50 m 0.00 m 0.00 m 0.00 m 0.00 m 0.00 m	Height
8.0 Living Area				20.50							m²				
9.0 External Walls															
	Туре	Constru	uction				Kappa (kJ/m²K)		Nett Area ²) (m ²)	Shelter Res	Shelte	er Ol	penings	Area Ca	alculatio ype
External Wall 1	Cavity Wall		vall : plasterbo vity, any outsic		AAC block,	0.15	60.00	50.85	25.53	0.00	None	1	25.32		ross Area
9.1 Party Walls Description	Туре		Construct						U-Value			Shel		Shel	ter
Party Wall 1	Filled C Edge S	Cavity with Sealing	Plasterboa sides, AAC		s mounted o avity	on ceme	nt render	on bot	(W/m²K) n 0.00	(kJ/m² 45.00		Re : 0.0		Nor	ıe
10.0 External Roofs															
Description	Туре	Co	nstruction			L	-Value N/m²K)(k	Kappa (J/m²K)	Gross Area(m²)	Nett Area	Shelter Code	Shelter Factor	Calcul Ty		pening
External Roof 1	External F Roof	Plane Pla	sterboard, i	nsulated a	t ceiling lev		0.11	9.00	70.60	(m²) 0.00	None		Enter (Are	Gross	0.00
10.2 Internal Ceilings															
Description Internal Ceiling 1		Storey +1	/	Constr Plaster	uction board ceiling	g, carpet	ed chipb	oard flo	or					Area (54.0	



Internal Ceiling 2	+2		Р	lasterboard ceiling	carpeted chipt	oard floor				4	2.00
11.0 Heat Loss Floors					,, -a. p = to a on pr						
Description	Type Sto	orey Index	Co	nstruction		U-Va (W/n		Shelter Code	Shelt Facto		a Area (m
Heatloss Floor 1	Ground Floor - Solid Lor	west occup	pied Sus	spended concrete floor	, carpeted	0.7		None	0.00		
12.0 Opening Types Description	Data Source Ty	уре		Glazing		Glazing		G-value	Frame	Frame	U Value
Opening Type 1 Opening Type 2		alf Glaze /indow	ed Door	Double Low-E \$ Double Low-E \$		Gap	Type Air Filled Air Filled		Type Wood Wood	Factor 0.80 0.80	(W/m²K 1.30 1.30
13.0 Openings											
Name Opening Opening Door	Opening Type Opening Type 2 Opening Type 2 Opening Type 1	2	Ext Ext	c ation ernal Wall 1 ernal Wall 1 ernal Wall 1		Ea	tation est ast ast	Area (14.8 7.90 2.53	9)		tch 0 0 0
14.0 Conservatory			Nor	ie							
15.0 Draught Proofing			100					%			
16.0 Draught Lobby			No					Ξ			
17.0 Thermal Bridging 17.1 List of Bridges			Cal	culate Bridges							
Bridge Type E5 Ground floor (norma E6 Intermediate floor wi E18 Party wall between P3 Party wall - Intermed (in blocks of flats) P2 Party wall - Intermed	ithin a dwelling dwellings diate floor between dw	-	Table K1 Table K1 Table K1	Type - Default - Default - Default - Default - Default - Default	Length 8.59 25.40 30.00 19.20 33.00	Psi 0.32 0.14 0.24 0.00	Adjusted 0.32 0.14 0.24 0.00 0.00	l Reference:			Importe Yes Yes Yes No
P5 Party wall - Roof (ins				- Default	12.60	0.48	0.48				No
Y-value			0.13	3				W/m²K			
18.0 Pressure Testing			Yes								
Designed AP ₅₀			3.0)				m³/(h.m	²) @ 50 Pa		
Property Tested?			Yes								
Test Method			Blo	wer Door							
As Built AP 50			0.1)				m³/(h.m	²) @ 50 Pa		
19.0 Mechanical Ventilation	on										
Mechanical Ventilation	า										
Mechanical Ventil	ation System Present		Yes								
Approved Installat			No					_			
Mechanical Ventil	ation data Type			abase							
Туре				anced mechanical	ventilation with	heat recov	ery				
MV Reference Nu	mber		500	167							
Configuration			2					_			
MVHR Duct Insula	ated			Ilated Ducts							
Manufacturer SFF			0.5								
Duct Type			Rig					_			
MVHR Efficiency			92.0	00				_			
Wet Rooms			2					_			
	Commissioning Certi	ificate	No					_			
MVHR System Lo				de heated envelop	be (installed excl	usively)		_			
Duct Installation S	Specification		Lev	el 1							
20.0 Fans, Open Fireplace											
21.0 Fixed Cooling Syster	n		No								
22.0 Lighting											
No Fixed Lighting				Name ghting 1	Efficacy 85.00	P	ower 5	 Capa 42			ount 10



4.0 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	
5.0 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	9								
Water Heating		Ma	ain Heating 1						

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 W	Yes										
28.1 Showers											
Description	:	Shower Type	•		F	low Rate [l/min]	Rated Pov [kW]	wer C	onnected	Connected	Го
Shower		Vented hot wa	ater system			7.00	[(11]		Yes	Storage Syst	em
28.3 Waste Water Heat Recovery Instantaneous System 1	System										
Database ID			80003								
Brand Model			Showersave	, Recol	h-vert RV3						
Details			Year: 2011 +	2017	Efficiency: 0 L	Itilisation fa	ctor: 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 accessibl	e pipev	vork insulated						
In Airing Cupboard			No								
31.0 Thermal Store			Hot water								
Thermal Store Pipework			connected b	v > 1.5	m pipework						
32.0 Photovoltaic Unit			One Dwellin	g							
Export Capable Meter?			Yes								
Connected To Dwelling			Yes								
Diverter			No								
Battery Capacity [kWh]			0.00								
PV Cells kWp	Orientation	Elevation	Oversh	ading	FGHRS	MCS Ce	ertificate	Over: Facto	or Č	MCS Certificate Reference	Panel Manufacturer
1.91	South East	30°	None O	r Little	No	No		1.00	г	Celefence	
34.0 Small-scale Hydro			None								
Electricity Generated			0.00								
Apportioned			0.00						kWh/Yea	r	
Connected to dwelling's electric	city meter		Yes								
Electricity Generation			Annual								
Jan Feb	Mar	Apr	Мау	Jun	Jul	Aug	g S	ер	Oct	Nov	Dec

Recommendations

Lower cost measures None Further measures to achieve even higher standards None

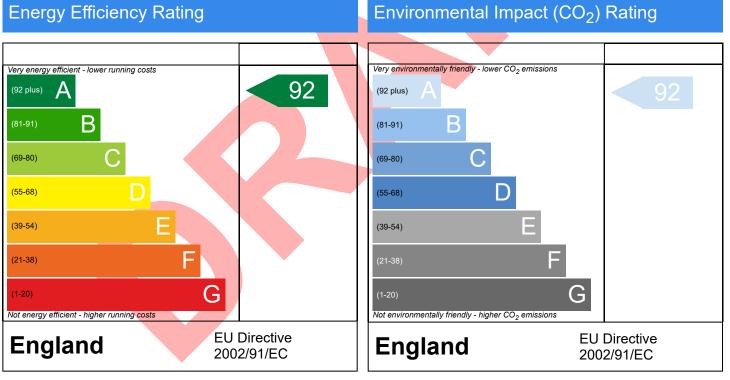


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

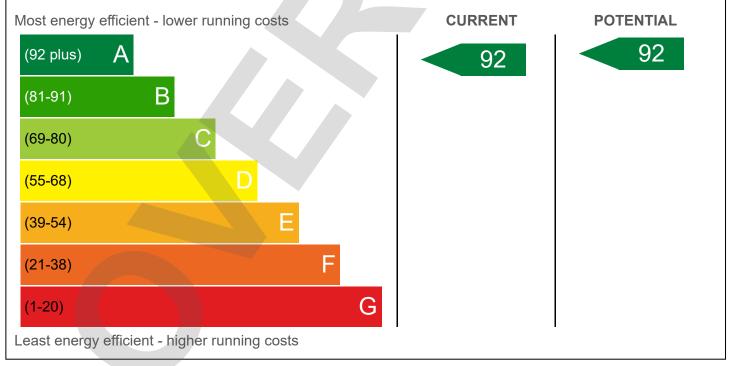


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m ²]	126

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.





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 transmi	ttance 0.15 W/m²K		Very Good
Roof	Average thermal transmi	ttance 0.11 W/m²K		Very Good
Floor	Average thermal transmi	ttance 0.12 W/m²K		Very Good
Windows	High performance glazing	g		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			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 CO₂ 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.

0.9

The	estimated	CO	emissions	for	this	dwellings	is:
-----	-----------	----	-----------	-----	------	-----------	-----

per year



With the recommended measures the potential CO emissions could be:

per year

1

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

Estimated energy use and potential savings



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		

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	у			
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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK
and roof windows				
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 ² K]		
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 ² K]				
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 D							
			[W/mK]	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 typicall	v expected	values are flagged with a subsequent (!))				
Maximum permitted air permeability at 5		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 radia	ators or und	erfloor heating - Mains gas				
Efficiency	89.1%	emoor heating - Mains gas				
Emitter type	Radiators					
Flow temperature	45°C					
System type	Notional					
Manufacturer	Notional					
Model	Notional					
Commissioning	litotoriai					
Secondary heating system: N/A	1					
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	<u> </u>	1				
Waste water heat recovery system 1 -		taneous				
Efficiency	0.0%					
Manufacturer	Hei-tech b					
Model	Recoh-ver	t RV3				
6 Controls						
Main heating 1 - type: Programmer, room	m thermosta	at, and TRVs				
Function						
Ecodesign class						
Manufacturer						
Model						
Water heating - type: N/A						
Manufacturer						
Model						
7 Lighting	 75 lm/W					
7 Lighting Minimum permitted light source efficacy	75 <i>lm/W</i> 85 lm/W		OK			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy	85 lm/W		ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control			ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation	85 lm/W N/A		OK			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me	85 lm/W N/A echanical ve	entilation with heat recovery	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power	85 lm/W N/A echanical ve 1.5 W/(l/s)	· · · ·				
 7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power 	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s)	· · · ·	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery	85 lm/W N/A echanical ve 1.5 W/(l/s)	· · · ·				
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s 73%	· · · ·	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92%)				
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92%	· · · ·	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92%)	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92%)	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model Commissioning	85 lm/W N/A chanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92% Sentinel Ki)	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation	85 lm/W N/A chanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92% Sentinel Ki)	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system	85 lm/W N/A chanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92% Sentinel Ki	inetic Plus B	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power	85 lm/W N/A chanical ve 1.5 W/(l/s) 0.55 W/(l/s 73% 92% Sentinel Ki Sentinel Ki 1.46 kWp	inetic Plus B	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power Orientation	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s) 73% 92% Sentinel K 92% Sentinel K 1.46 kWp South Eas 30°	inetic Plus B	ОК			
7 Lighting Minimum permitted light source efficacy Lowest light source efficacy External lights control 8 Mechanical ventilation System type: Balanced whole-house me Maximum permitted specific fan power Minimum permitted heat recovery efficiency Heat recovery efficiency Manufacturer/Model Commissioning 9 Local generation Technology type: Photovoltaic system Peak power Orientation	85 lm/W N/A echanical ve 1.5 W/(l/s) 0.55 W/(l/s) 73% 92% Sentinel K 92% Sentinel K 1.46 kWp South Eas 30°	inetic Plus B	ОК			

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					



Property Reference	Grego	gs Baker	у							Issue	d on Date	05/0)5/2023	
Assessment Reference	Greg	gs-F-2B4	P-Be Lean	1			Prop	Туре	Ref	Greggs	Bakery			
Property	Gregs	s Bakery	D12 - Tow	nhouse, D	12, Twickenh	am, Thai	mes Valle	ey						
						DED		40.	~-		TED		0.04	
SAP Rating				90 B		DER		10.	65		TER		3.31	
Environmental				92 A		% DER	< IER						9.98	
CO ₂ Emissions (t/year)				0.66		DFEE		36.	32		TFEE		35.58	
Compliance Check				See BRI	EL		E < TFEE						2.07	
% DPER < TPER				18.29		DPER		57.9	96		TPER	7	70.93	
Assessor Details	Mr. Keith k	Ketchley									Assesso	r ID 🛛	2303-0001	
Client														
SUMMARY FOR INPUT	DATA FO	R: Nev	/ Build (/	As Desig	gned)									
Orientation				Northea	st									
Property Tenture				ND										
Transaction Type				6										
Terrain Type				Suburba	ın									
1.0 Property Type					I-Terrace									
Position of Flat				· · · ·	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 Paramete	-			Precise calculation										
6.0 I nermal mass Parameter Thermal Mass			N/A	calculation						kJ/m²K				
				IN/A										
7.0 Electricity Tariff				Standard	d									
Smart electricity meter fitte	ed			Yes										
Smart gas meter fitted				Yes										
7.0 Measurements					Basement Ground floor 1st Storey 2nd Storey 3rd Storey 4th Storey 5th Storey 6th Storey 7th Storey		Loss Pe 0.00 m 15.00 n 12.70 n 12.70 n 0.00 m 0.00 m 0.00 m 0.00 m	1 n n 1 1 1	er Int	ternal Fl 0.00 71.00 54.00 31.00 0.00 0.00 0.00 0.00 0.00 0.00	m ² m ² m ² m ² m ² m ² m ²	Averaç	ge Storey I 0.00 m 3.00 m 2.50 m 2.50 m 0.00 m 0.00 m 0.00 m 0.00 m 0.00 m	Heigh
8.0 Living Area				24.60							m²			
9.0 External Walls Description Ty	/ре	Constr	uction			U-Value			Nett Area		Shelter	Openir	igs Area Ca	
	avity Wall		vall : plasterbo vity, any outsi			(W/m²K) 0.15	(kJ/m²K) / 60.00			Res 0.00	None	17.20	Ту	rpe
9.1 Party Walls				_									_	
Description	Туре		Construc	tion					U-Value (W/m ² K)			Shelter Res	Shelt	ler
Party Wall 1	Filled Cav Edge Sea		Plasterbo sides, AA		bs mounted o cavity	n cemen	t render o	on both		` 45.00	55.65	0.00	Non	e
10.1 Party Ceilings Description			Constructi	ion									appa Ar /m²K)	ea (m
Party Ceiling 1			In-situ cono	crete slab	supported by	profiled	metal dec	ck, car	peted			9		71.30
10.2 Internal Ceilings														
Description Internal Ceiling 1		Store Lowes	y st occupied		r uction rboard ceiling	, carpete	d chipbo	ard flo	or				Area (ı 54.00	



Internal Ceiling 2	Lo	owest occupied	Plasterboard ceilir	ng, carpeted chipbo	oard floor				42	2.00
11.0 Heat Loss Floors										
Description Type		Storey Index	Construction		U-Val (W/m	²K)	Shelter Code	Shel Fac	tor (kJ/m ²	
	und Floor - Solid	Lowest occupied	Suspended concrete flo	or, carpeted	0.12	2	None	0.0	0 75.0	0 31.00
12.0 Opening Types Description D	ata Source	Туре	Glazing		Glazing	Filling	G-value	Frame	Frame	U Value
·		Solid Door	-	Soft 0.05	Gap	Туре		Туре	Factor	(W/m²K
Opening Type 2 M	anufacturer anufacturer	Window	Double Low-E Double Low-E			Air Filled Air Filled	0.63 0.63	Wood Wood	0.80 0.80	1.30 1.30
13.0 Openings Name	Opening Ty	~~	Location		Orient	otion	Area ((m ²)	Die	ch
Opening	Opening Typ	e 2	External Wall 1		Nor	th	2.4	0	(C
Opening Patio Door	Opening Typ Opening Typ	e 2	External Wall 1 External Wall 1		Nor Nor		2.4 5.6))
Opening Opening	Opening Typ Opening Typ		External Wall 1 External Wall 1		We We		2.4 2.4))
Front Door	Opening Typ		External Wall 1		Sou		2.0			Ď
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		S	urce Type	Length	Psi	Adjusted	Reference			Importe
E5 Ground floor (normal) E18 Party wall between dwel	lings	Tab	le K1 - Default le K1 - Default	15.00 12.00	0.32	0.32 0.24	Kelerence.			Yes Yes
Y-value			0.09				W/m²K			
18.0 Pressure Testing			Yes							
-			3.00					2) @ 50 Do		
Designed AP ₅₀								²) @ 50 Pa		
Property Tested?			Yes							
Test Method			Blower Door				3//1	3) O 50 D-		
As Built AP ₅₀			0.10				m%(n.m	²) @ 50 Pa		
19.0 Mechanical Ventilation										
Mechanical Ventilation Mechanical Ventilation	System Prese	ent	Yes				7			
Approved Installation	e jetein rieet		No							
Mechanical Ventilation	data Type		Database				\exists			
Туре	data Type		Balanced mechanica	al ventilation with h	eat recove	-rv				
MV Reference Number			500167			. ,	\exists			
Configuration			2							
MVHR Duct Insulated			Insulated Ducts							
Manufacturer SFP			0.55				\exists			
Duct Type			Rigid				4			
MVHR Efficiency			92.00							
Wet Rooms			2							
SFP from Installer Com		ertificate	2 No				\exists			
MVHR System Location	-		Inside heated envelo	one (installed over	(sively)					
Duct Installation Specifi			Level 1	אין איז	Joivery)		4			
			Level 1							
20.0 Fans, Open Fireplaces, Flue 21.0 Fixed Cooling System	ues		No							
21.0 Fixed Cooling System 22.0 Lighting										
No Fixed Lighting			No							
5 5			Name Lighting 1	Efficacy 85.00		wer 5	 Capa 42	city		unt 0
						-	7	-		-
24.0 Main Heating 1			Manufacturer							



26.0 Heat Networks	None]
25.0 Main Heating 2	None]
Combi keep hot type	None	
Combi boiler type	Standard Combi]
Boiler Interlock	Yes	
Flow Temperature Value	45.00	
Flow Temperature	Enter value]
Underfloor Heating	Yes - Pipes in thin screed]
Heat Emitter	Radiators]
Heating Pump Age	2013 or later]
Is MHS Pumped	Pump in heated space]
Fan Assisted Flue	No]
Flue Type	None or Unknown]
FI Case	0.00]
Oil Pump Inside	No]
HETAS approved System	No]
Burner Control	Modulating]
Delayed Start Stat	Yes	
Controls SAP Code	2106	
System Type	Notional	
Manufacturer	Notional	
Model Name	Notional	
In Summer	89.10	
In Winter	89.10	
SAP Code	104	
Fuel Type	Mains gas	
Database Ref. No.	0	
Percentage of Heat		8
Description	Notional Spec Boiler]

	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



28.1 Showers Description Shower Type Flow Rate Rated Power Connected Connected To [l/min] [kW] Shower Vented hot water system Storage System 7.00 No 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 No Cylinder Stat Cylinder In Heated Space No No Independent Time Control Insulation Type Measured Loss 245.00 Cylinder Volume L 1.92 kWh/day Loss No In Airing Cupboard 31.0 Thermal Store None 32.0 Photovoltaic Unit Multiple Dwellings – Connected Export Capable Meter? Yes Connected To Dwelling Yes No Diverter Battery Capacity [kWh] 0.00 PV Cells kWp Overshading FGHRS MCS Certificate Orientation Elevation Overshading MCS Panel Manufacturer Factor Certificate Reference 1.46 South East 30° Modest Yes 0.80 No None 34.0 Small-scale Hydro **Electricity Generated** 0.00 Apportioned 0.00 kWh/Year Connected to dwelling's electricity meter Yes Annual **Electricity Generation** Feb May Jan Mar Apr Jun Jul Aug Sep Oct Nov Dec 35.0 Special Features Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Energy Fuel Saved Energy Fuel Used Description Monthly Air Special Change Rates Saved Used Technologies Type CO2 saving 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 feature

Recommendations

Lower cost measures

None Further measures to achieve even higher standards None

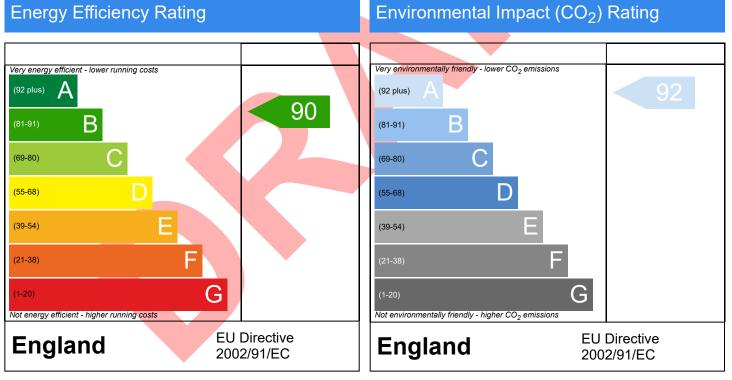


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

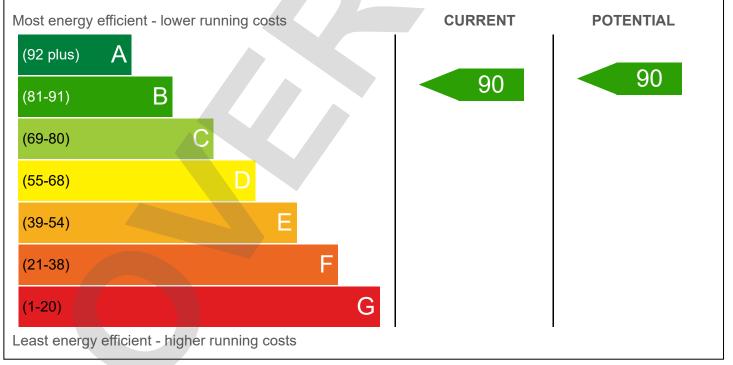


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley				
Report Date	05/05/2023				
Property Type	Flat, Mid-Terrace				
Floor Area [m ²]	71				

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.





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 transmit	ttance 0.15 W/m²K		Very Good
Floor	Average thermal transmit	Very Good		
Windows	High performance glazin	Good		
Main heating	Boiler and radiators, main	Very Good		
Main heating controls	Programmer, room therm	nostat and TRVs		Good
Secondary heating	None			
Hot water	From main system, waste	e 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 CO₂ 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 CC	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	Potential Rating	Cumulative	Cumulative
	Yearly	after	savings	Potential
	Saving	measure installed	(per year)	Rating

Estimated energy use and potential savings



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			

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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK
and roof windows				
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 ² K]		
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/n						
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 - I	Main Dwelling: Thermal bridging ca	Iculated from linear thermal transmit	tances for each ju	Inction		
Main element	Main element Junction detail Source Psi value Drawing /					
			[W/mK]	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			Not government-approved scheme	0 (!)				
3 Air permeabili	ty (better than typical	y expected	values are flagged with a su	ubsequent (!))				
	ted air permeability at 5	0Pa	8 m ³ /hm ²					
Dwelling air pern			3 m ³ /hm ² , Design value (!)		OK			
Air permeability test certificate reference 1								
4 Space heating								
	stem 1: Boiler with radi		erfloor heating - Mains gas					
Efficiency		89.1%						
Emitter type		Radiators						
Flow temperature	9	45°C						
System type Manufacturer		Notional Notional						
Model		Notional						
Commissioning		Notional						
Secondary heat	ing system: N/A	1						
Fuel	<u> </u>	N/A						
Efficiency		N/A						
Commissioning								
5 Hot water								
Cylinder/store -	type: N/A							
Capacity		N/A						
Declared heat los	SS	N/A						
Primary pipeworl		N/A						
Manufacturer								
Model								
Commissioning								
	at recovery system 1 -		itaneous					
Efficiency		0.0%						
Manufacturer Hei-tech b.v.								
Model		Recoh-ver	t RV3					
6 Controls								
	type: Programmer, roo	m thermosta	at, and TRVs					
Function								
Ecodesign class								
Manufacturer								
Model	tura 11/1							
Water heating - Manufacturer	type: N/A							
Model								
		1						
7 Lighting	a d liadat a stri							
Lowest light sour	ed light source efficacy	75 <i>lm/W</i> 85 lm/W			ОК			
External lights co		N/A			UK			
• •		IN/ <i>F</i>						
8 Mechanical ve								
System type: Ba	alanced whole-house m		entilation with heat recovery					
	ted specific fan power	1.5 W/(I/s)	A		OK			
Specific fan pow		0.55 W/(l/s	51		ОК			
	ed heat recovery	73%						
<i>efficiency</i> Heat recovery ef	ficiency	92%			ОК			
Manufacturer/Mc			inetic Plus B					
Commissioning								
-		1						
9 Local generat	ion							
N/A								
10 Heat network	(S							
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						



Property Reference	Gre	eggs Bake	ry							Issue	d on Da	te	05/05/	2023
Assessment Reference	Gre	ggs - 3F	2B4P - Be L	ean			Prop	Type F	Ref	Greggs	Bakery			
Property	Gre	gs Baker	y D12 - Towr	nhouse, D12, Twicl	kenhan	n, Thames	s Valley	/						
SAP Rating				85 B		DER		11.7	5		TER		11.9	93
Environmental				91 B	_	6 DER < T	ER		5				1.5	
CO ₂ Emissions (t/year)				0.77	_	FEE		30.5	4		TFEE		33.	
Compliance Check				See BREL		6 DFEE <	TFEE	00.0	T				7.9	
% DPER < TPER				-7.80	_	PER		67.5	7		TPER		62.	
Assessor Details	Mr. Keit	h Ketchley	1								Assess	or ID	03	03-0001
Client		Tretonicy									100000		QU	00-0001
	UT DATA F	OR: Net	w Build (A	s Designed)										
Drientation	UT BAIAT		n Bana (r	Northeast										
				ND										
Property Tenture				6										
ransaction Type														
errain Type				Suburban										
.0 Property Type				Flat, Detached										
Position of Flat				Top-floor flat										
Which Floor				3										
.0 Number of Storeys				1										
3.0 Date Built				2023										
.0 Sheltered Sides				2										
.0 Sunlight/Shade				Average or unkno	own									
5.0 Thermal Mass Parameter			Precise calculation	on										
Thermal Mass				N/A							kJ/m²K			
.0 Electricity Tariff				Standard										
Smart electricity meter	fitted			Yes										
Smart gas meter fitted				Yes										
7.0 Measurements							_							
				Baser Ground 1 1st St 2nd St 3rd St 4th St 5th St 6th St 7th St	floor: orey: orey: orey: orey: orey: orey:	45 12 12 0 0 0 0 0	.00 m 5.95 m 2.70 m 2.70 m .00 m .00 m .00 m .00 m			0.00 71.30 54.00 31.00 0.00 0.00 0.00 0.00) m ²) m ²) m ² m ² m ² m ² m ²			Storey Hei 0.00 m 2.50 m 2.50 m 0.00 m 0.00 m 0.00 m 0.00 m 0.00 m
				26.00							m²			
3.0 Living Area									Nett Area	Shelter	Shelte	er Or	eninas	Area Calcula
3.0 Living Area .0.0 External Walls Description	Туре	Const	ruction		L	J-Value Ka	ppa (Gross				- P	35	Type Enter Gross
.0 External Walls	Type Cavity Wall	Cavity		pard on dabs, AAC bloc de structure	()	N/m²K) (kJ/	m²K) A		(m²) 26.70	Res 0.00	None	э .	19.20	
.0 External Walls Description External Wall 1		Cavity	wall : plasterbo		()	N/m²K) (kJ/	m²K) A	rea(m²)	(m²)	Res	None	э 	19.20	
Description	Cavity Wall Type Filled C	Cavity filled c	wall : plasterbo avity, any outsi Construc Plasterboa	de structure tion ard on dabs mount	(k ,	W/m²K) (kJ / 0.15 60	m²K) A	rea(m²) 45.90	(m²)	Res 0.00 Kappa	Area	Shelt Res	er	Shelter None
0.0 External Walls Description External Wall 1 0.1 Party Walls Description	Cavity Wall	Cavity filled c	wall : plasterbo avity, any outsi Construc Plasterboa	de structure	(k ,	W/m²K) (kJ / 0.15 60	m²K) A	rea(m²) 45.90	(m²) 26.70 U-Value (W/m²K)	Res 0.00 Kappa (kJ/m²k	Area	Shelt Res	er	Shelter
Description External Wall 1 I Party Walls Description Party Wall 1	Cavity Wall Type Filled C	Cavity filled c Cavity with ealing	wall : plasterbo avity, any outsi Construc Plasterboa	de structure tion ard on dabs mount	(k ,	W/m²K) (kJ/ 0.15 60 cement rel	m²K) An 0.00 nder or ue Ka	rea(m²) 45.90 n both	(m²) 26.70 U-Value (W/m²K)	Res 0.00 Kappa (kJ/m²k 45.00 Nett	Area () (m²) 55.65 Shelter	Shelt Res	er S	Shelter None



Description		Storey	Cor	struction						Kappa	
Party Floor 1		Index Lowest occupied		tu concrete slab suppo	rted by profiled	metal deck	, carpeted			(kJ/m²K) 90.00	71.30
12.0 Opening Types Description D	ata Source	Туре		Glazing		Glazing	Filling	G-value	Frame	Frame	U Value
-		Solid Doc		Double Low-E S	off 0 05	Gap	Туре		Type Wood	Factor	(W/m²K
-1 5 71	anufacturer anufacturer	Window		Double Low-E S			Air Filled Air Filled	0.63 0.63	Wood	0.80 0.80	1.30 1.30
13.0 Openings									<i>.</i> .		
Name Opening	Opening Ty Opening Typ	be 2		Location External Wall 1		Orient Nor		Area 2.4	0		tch 0
Opening Patio Door	Opening Typ Opening Typ			External Wall 1 External Wall 1		Nor Nor		2.4 5.6			0 0
Opening Opening	Opening Typ Opening Typ	be 2		External Wall 1 External Wall 1		Ea	st	2.4 2.4	0		0 0
Opening	Opening Typ	be 1		External Wall 1		Sou	ıth	2.0	0		0
Front Door	Opening Typ	be 1		External Wall 1		Sol	Ith	2.0	0		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			Sou	rce Type	Length	Psi	Adjusted	Reference			Importe
E7 Party floor between dwelli E16 Corner (normal)	ings (in block	s of flats)	Non	Gov Approved Scheme Gov Approved Scheme	es 45.95	0.00	0.00 0.00				Yes Yes
Y-value				0.00				W/m²K			
18.0 Pressure Testing				Yes							
Designed AP50				3.00				m³/(h.m	²) @ 50 Pa	a	
Property Tested?				Yes							
Test Method				Blower Door							
As Built AP50				0.10				m³/(h.m	²) @ 50 Pa	a	
19.0 Mechanical Ventilation											
Mechanical Ventilation								_			
Mechanical Ventilation	System Prese	ent		Yes				_			
Approved Installation				No				_			
Mechanical Ventilation	data Type			Database				_			
Туре				Balanced mechanical	ventilation with	heat recove	ery	_			
MV Reference Number				500167				_			
Configuration				2							
MVHR Duct Insulated				Insulated Ducts				_			
Manufacturer SFP				0.55				_			
Duct Type				Rigid				_			
MVHR Efficiency				92.00				4			
Wet Rooms				2							
SFP from Installer Com	-	ertificate		No							
MVHR System Location				Inside heated envelope	e (installed excl	usively)					
Duct Installation Specif				Level 1							
20.0 Fans, Open Fireplaces, Fl	ues										
21.0 Fixed Cooling System				No							
22.0 Lighting No Fixed Lighting				No							
No Fixed Lighting				Name Lighting 1	Efficacy 85.00		wer 5	L Capa	acity 25		ount 10
24.0 Main Heating 1				Manufacturer				 			



26.0 Heat Networks	None]
25.0 Main Heating 2	None]
Combi keep hot type	None	
Combi boiler type	Standard Combi]
Boiler Interlock	Yes	
Flow Temperature Value	45.00	
Flow Temperature	Enter value]
Underfloor Heating	Yes - Pipes in thin screed]
Heat Emitter	Radiators]
Heating Pump Age	2013 or later]
Is MHS Pumped	Pump in heated space]
Fan Assisted Flue	No]
Flue Type	None or Unknown]
FI Case	0.00]
Oil Pump Inside	No]
HETAS approved System	No]
Burner Control	Modulating]
Delayed Start Stat	Yes	
Controls SAP Code	2106	
System Type	Notional	
Manufacturer	Notional	
Model Name	Notional	
In Summer	89.10	
In Winter	89.10	
SAP Code	104	
Fuel Type	Mains gas	
Database Ref. No.	0	
Percentage of Heat		8
Description	Notional Spec Boiler]

	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



28.1 Showers Description Shower Type Flow Rate Rated Power Connected Connected To [l/min] [kW] Shower Vented hot water system Storage System 7.00 No 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 No Cylinder Stat Cylinder In Heated Space No No Independent Time Control Insulation Type Measured Loss 245.00 Cylinder Volume L 1.92 kWh/day Loss No In Airing Cupboard 31.0 Thermal Store None None 34.0 Small-scale Hydro 0.00 **Electricity Generated** 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 Monthly Air Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Energy Fuel Saved Energy Fuel Used Description Special Saved Used Change Rates Technologies Type CO2 saving feature 0.00 0.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards None

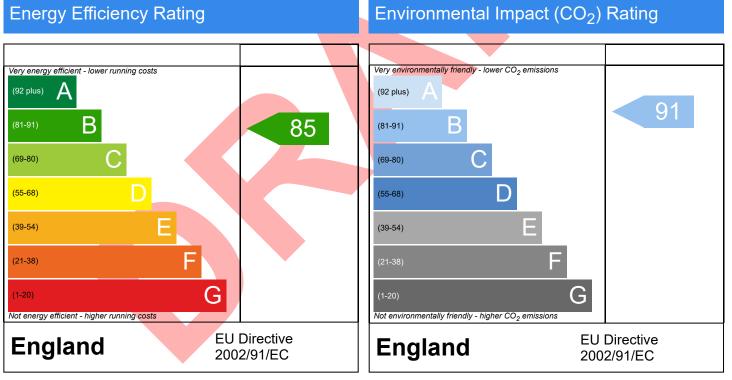


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

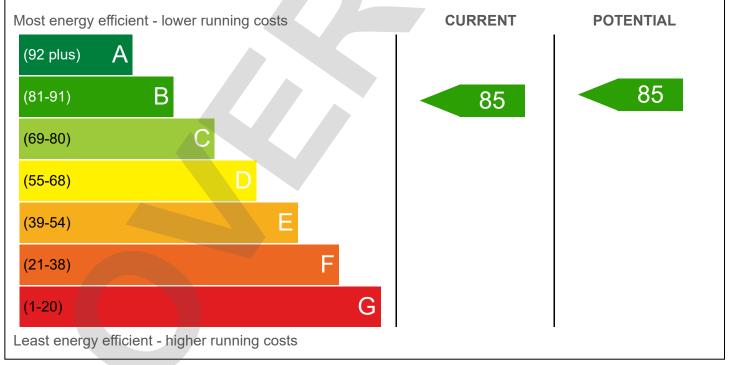


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Detached
Floor Area [m ²]	71

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.





Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	or Average Good		Very Good	
Feature	Description	Description			
Walls	Average thermal transmit	ttance 0.15 W/m²K		Very Good	
Roof	Average thermal transmit	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				
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 CO₂ 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 CC	emissions	s 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	Potential Rating	Cumulative	Cumulative
	Yearly	after	savings	Potential
	Saving	measure installed	(per year)	Rating

Estimated energy use and potential savings



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	

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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK
and roof windows				
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 ² K]		
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 ² K]
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 - I	Main Dwelling: Thermal bridging ca	Iculated from linear thermal transmi	ttances for each ju	unction
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 permeabili	ty (better than typically	y expected	values are flagged with a subsec	quent (!))	
Maximum permitted air permeability at 50Pa			8 m ³ /hm ²		
Dwelling air perm	neability at 50Pa		3 m ³ /hm ² , Design value (!)		OK
	est certificate reference		1		
4 Space heating					
		ators or unde	erfloor heating - Mains gas		
Efficiency		89.1%	5 5		
Emitter type		Radiators			
Flow temperature	9	45°C			
System type		Notional			
Manufacturer		Notional			
Model		Notional			
Commissioning					
Secondary heat	ing system: N/A				
Fuel		N/A			
Efficiency		N/A			
Commissioning					
5 Hot water		•			
Cylinder/store -	type: N/A				
Capacity		N/A			
Declared heat los	29	N/A			
Primary pipework		N/A			
Manufacturer		1.1.7.1			
Model					
Commissioning					
Waste water heat recovery system 1 - type: Instantaneous					
Efficiency		0.0%			
Manufacturer		Hei-tech b.v.			
Model		Recoh-vert RV3			
6 Controls					
	type: Programmer, roor	n thermosta	t and TRVs		
Function	type. I rogrammer, roor				
Ecodesign class					
Manufacturer					
Model					
Water heating -	type: N/A	1			
Manufacturer	AL				
Model					
7 Lighting Minimum permitt	ed light source efficacy	75 lm/W			
Lowest light sour		85 lm/W			ОК
External lights co		N/A			UN
8 Mechanical ventilation					
			ntilation with heat recovery		
	ted specific fan power	1.5 W/(I/s)	A		01/
Specific fan powe		0.55 W/(I/s)		OK
Minimum permitt	ed heat recovery	73%			
efficiency					
Heat recovery eff		92%			OK
Manufacturer/Mo	del	Sentinel Ki	netic 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:		Assessor ID:	
Name: Date:		Date:	
b. Client Declaration			
N/A			



Property Reference	Greg	Greggs Bakery Issued on Date 05/05/2023							2023					
Assessment Reference								Gregg	s Bakery					
Property	Greg	js Bakery D12 -	Townhouse	e, D12, Twicken	ham, Tha	imes Val	ley							
CAD Doting					DED		7.4			TED		40.	F 4	
SAP Rating			93 A				7.4	Ő		TER		10.		
Environmental			94 A			R < TER		~7		TEEE		29.2		
CO ₂ Emissions (t/year)			0.48		DFEE		33.9	97		TFEE				
Compliance Check				BREL		E < TFE				TDED		12.		
% DPER < TPER			18.7		DPER		44.8	87		TPER		55.2	20	
Assessor Details	Mr. Keith	Ketchley								Assess	or ID	Q30	03-0001	I
Client														
SUMMARY FOR INPU	JT DATA FO	DR: New Buil	d (As De	signed)										
Drientation			Unkn	own										
Property Tenture			ND											
ransaction Type			6											
errain Type			Subu	rban										
.0 Property Type				e, Mid-Terrace										
Which Floor			0	,										
.0 Number of Storeys			2											
.0 Date Built			2023											
.0 Sheltered Sides			0											
.0 Sunlight/Shade			-	Average or unknown										
.0 Thermal Mass Param	eter			Precise calculation										
Thermal Mass				N/A						kJ/m²K				
.0 Electricity Tariff			Stan	dard										
Smart electricity meter	fitted		Yes											
Smart gas meter fitted			Yes											
.0 Measurements					Haa	t Loss P	orimote			loor Area			Storey	Holak
				Basemer	it:	0.00	n		0.00) m²		0	.00 m	neign
				Ground floo 1st Store	y:	10.90 11.20	m		23.1	0 m² 5 m²		2	2.50 m 2.50 m	
				2nd Store 3rd Store		12.70 0.00 i				0 m²) m²			.50 m .00 m	
				4th Store	y:	0.00	n		0.00) m²		0	0.00 m	
				5th Store 6th Store		0.00 i 0.00 i) m²) m²			0.00 m 0.00 m	
				7th Store	y:	0.00 ו	n		0.00) m²		0	0.00 m	
.0 Living Area			23.03	3						m²				
.0 External Walls														
Description	Туре	Construction				Kappa (kJ/m²K)		Nett Area) (m²)	Res	Shelte	er Oj	penings	Area Ca Ty	уре
External Wall 1	Cavity Wall	Cavity wall : pla filled cavity, any		dabs, AAC block, ture	` 0.15 <i>`</i>	60.00	50.85	34.77	0.00	None	•	16.08	Enter G	ross Are
.1 Party Walls														
Description	Туре	Cons	truction					U-Value (W/m²K)			Shel Re		Shel	ter
Party Wall 1	Filled Ca Edge Se		erboard on , AAC blocl	dabs mounted <s, cavity<="" td=""><td>on cemei</td><td>nt render</td><td>on both</td><td></td><td>45.00</td><td></td><td></td><td></td><td>Nor</td><td>ıe</td></s,>	on cemei	nt render	on both		45.00				Nor	ıe
0.0 External Roofs	_	-						-	•			
Description	Туре	Construc	tion			-Value V/m²K)(I		Gross Area(m²)	Nett Area	Shelter Code	Shelter Factor	Calcul Typ		penin
Description					(-	0.11	9.00	76.20	(m²) 5.00	None	0.00			5.00
External Roof 1	External SI Roof	ope Plasterbo	ard, insulat	ed slope		0.11	3.00					Are		2.00
		ope Plasterbo	ard, insulat	ed slope		0.11	3.00							



11.0 Heat Loss Floors Description	Туре	Storey Index	Construction		U-Val		Shelter Code	She	lter Kap	opa Area (m ^a
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete	floor, carpeted	(W/m ² 0.12		None	Fac 0.0	tor (kJ/n	n²K)
12.0 Opening Types										
Description	Data Source	Туре	Glazing		Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Half Glazed Do		-E Soft 0.05	Cap	Air Filled	0.63	Wood	0.80	` 1.30 ´
Opening Type 2 Opening Type 3	Manufacturer Manufacturer	Window Roof Light	Double Low Triple Low-E	-E Soft 0.05 E Soft 0.05		Air Filled Air Filled	0.63 0.57	Wood Wood	0.80 0.70	1.30 1.30
13.0 Openings										
Name Opening	Opening Ty Opening Typ		Location External Wall 1		Orienta Nor		Area (8.1		Р	i tch 0
Opening	Opening Typ	e 2	External Wall 1		Eas	st	5.4	0		0
Door Opening	Opening Typ Opening Typ		External Wall 1 External Roof 1		Eas Nor		2.5 5.0			0 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		Sou	Irce Type	Length	Psi	Adjusted	Reference			Imported
E5 Ground floor (normal)		Gov	Approved Scheme	e 10.90	0.00	0.00		•		Yes
E6 Intermediate floor wit E18 Party wall between o			Approved Scheme Approved Scheme		0.00 0.00	0.00 0.00				Yes Yes
Y-value			0.00							
18.0 Pressure Testing			Yes							
Designed AP ₅₀			3.00					^ı ²) @ 50 Pa		
Property Tested?			Yes					, 0		
Test Method			Blower Door				=			
As Built AP₅₀	0.10					^{ı²}) @ 50 Pa				
19.0 Mechanical Ventilation	•							, 0		
Mechanical Ventilation	1									
Mechanical Ventila	tion System Prese	ent	Yes							
Approved Installation	on		No							
Mechanical Ventila	tion data Type		Database							
Туре			Balanced mechan	ical ventilation with I	neat recove	ry				
MV Reference Nun	nber		500167							
Configuration			2							
MVHR Duct Insulat	ted		Insulated Ducts							
Manufacturer SFP			0.55							
Duct Type			Rigid				Ē			
MVHR Efficiency			92.00				Ξ			
Wet Rooms			2				Ξ			
SFP from Installer	Commissioning C	ertificate	No				Ξ			
MVHR System Location			Inside heated envelope (installed exclusively)							
Duct Installation Sp	Level 1									
20.0 Fans, Open Fireplaces										
21.0 Fixed Cooling System	1		No							
22.0 Lighting										
No Fixed Lighting			No							
			Name Lighting 1	Efficacy 85.00		wer 5	Capa 42		С	ount 10
24.0 Main Heating 1			Manufacturer							
Description			Notional				7			



25.0 Main Heating 2	None	
Combi keep hot type	Electric, time clock	
Combi boiler type	Standard Combi	
Boiler Interlock	Yes	
Flow Temperature Value	45.00	
Flow Temperature	Enter value	
Underfloor Heating	Yes - Pipes in thin screed	
Heat Emitter	Radiators	
Heating Pump Age	2013 or later	
Is MHS Pumped	Pump in heated space	
Fan Assisted Flue	No	
Flue Type	None or Unknown	
FI Case	0.00	
Oil Pump Inside	No	
HETAS approved System	No	
Burner Control	Modulating	
Delayed Start Stat	Yes	
Controls SAP Code	2106	
System Type	Notional	-
Manufacturer	Notional	
Model Name	Notional	
In Summer	89.10	
In Winter	89.10	
SAP Code	104	
Fuel Type	Mains gas	
Database Ref. No.	0	
Percentage of Heat	100.00	%

26.0 Heat Networks

	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

None

28.1 Showers



Description	SI	nower Type			ow Rate [I/min]	Rated Power ([kW]	Connected	Connected 1	ō
Shower	Ve	ented hot wa	ater system		7.00	[KW]	No	Storage Syst	em
28.3 Waste Water Heat Recovery Sys Instantaneous System 1	stem								
Database ID			80003]		
Brand Model			Showersave, Reco	h-vert RV3]		
Details			Year: 2011 + 2017	Efficiency: 0 Ut	ilisation fac	tor: 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 Or	ientation	Elevation	Overshading	FGHRS	MCS Cer	tificate Over Fact	or Č	ACS Certificate Reference	Panel Manufacture
3.50 So	outh 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				1		
Jan Feb Ma	ır A	Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec
35.0 Special Features									
Energy Fuel Saved Energy Saved Used	Fuel Used	Descri	ption Monthl Change		pecial nologies	Jan Feb Mar	Apr May Ju	n Jul Aug Se	p Oct Nov De
0.00 0.00					Type 2 saving eature	0.00 0.00 0.00 0	0.00 0.00 0.0	0.000.000.000.0	0.000.000.000.00

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards None

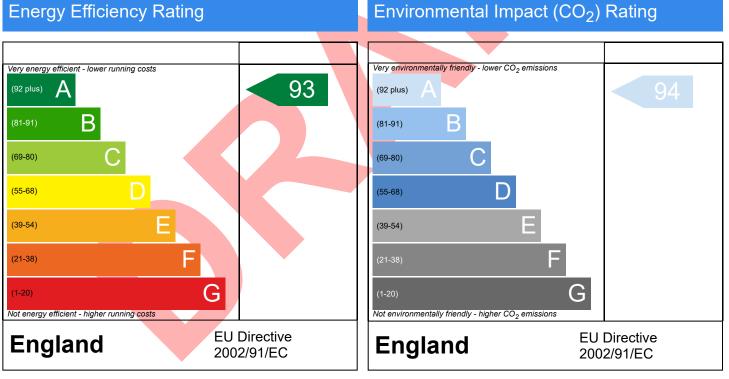


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

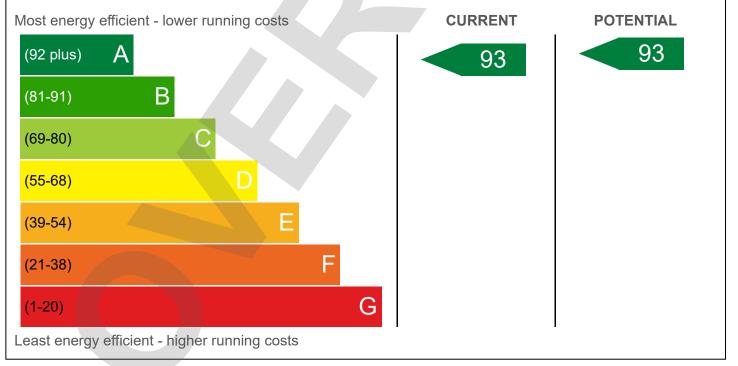


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m ²]	80

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.





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 transmit	ttance 0.15 W/m²K		Very Good
Roof	Average thermal transmit	ttance 0.11 W/m²K		Very Good
Floor	Average thermal transmit	Very Good		
Windows	High performance glazine	Good		
Main heating	Boiler and radiators, main	Very Good		
Main heating controls	Programmer, room therm	Good		
Secondary heating	None			
Hot water	From main system, waste	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 CO₂ 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	СО	emissions	for	this	dwellings	is:
-----	-----------	----	-----------	-----	------	-----------	-----

0.5 per year



With the recommended measures the potential CO emissions could be:

per year

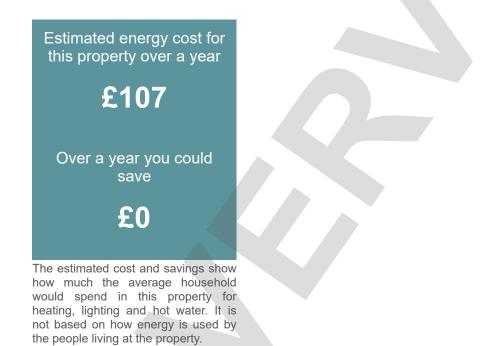
0

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

Estimated energy use and potential savings



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			

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

 Ref:
 1823-50-RPT-09

 Date:
 9th May 2023

 Revision:
 07

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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK	
and roof windows					
Rooflights	2.2	N/A	N/A	N/A	

Name				Net area [m ²]	U-Value [W/m ² K]
Exposed wall: W	/alls (1)			29.7	0.15
2c Openings (b	etter than typicall	y expected value	s are flagged with a sub	osequent (!))	
Name		Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, Openi	ng Type 2	2.5	East	0.8	1.3
Opening, Openi	ng Type 2	2.5	East	0.8	1.3
Patio Door, Ope	ning Type 2	5.6	East	0.8	1.3
Opening, Openi	ng Type 2	3.6	West	0.8	1.3
Front Door, Ope	ning Type 1	2	North	N/A	1.3
2d Thermal brid	dging (better than	typically expecte	ed values are flagged wi	th a subsequent (!))	
			culated from linear therm		ach junction
Main element	Junction detail	00	Source	Psi value	Drawing /
				[\A//mal/]	reference

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E7: Party floor between dwellings	Government-approved scheme	0 (!)	Telefence
	(in blocks of flats)			
External wall	E16: Corner (normal)	Government-approved scheme	0 (!)	

3 Air permeability (better than typical	vernected	values are flagged with a subsequent (!))	
Maximum permitted air permeability at 5		8 m ³ /hm ²	
Dwelling air permeability at 50Pa	01 0	3 m ³ /hm ² , Design value (!)	OK
Air permeability test certificate reference		1	
4 Space heating			
Main heating system 1: Heat pump with		r underfloor heating - Electricity	
Efficiency	287.9%		
Emitter type	Radiators		
Flow temperature	35°C		
System type	Heat Pump		
Manufacturer Model	Daikin Eur	OPE NV CAV3 + EHVH08SU26CB6W	
Commissioning	ERLQUUOU	JAV3 + EHVH065020CB600	
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 Manufacturer	N/A		
Model			
Commissioning	+		
Waste water heat recovery system 1 -	type: N/A		
Efficiency			
Manufacturer			
Model	-		
	-1		
6 Controls	en the sume set s	et and TDV/c	
Main heating 1 - type: Programmer, roo Function			
Ecodesign class	-		
Manufacturer			
Model	-		
Water heating - type: N/A	-1		
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		
	1		
8 Mechanical ventilation			
System type: Balanced whole-house me		entilation with heat recovery	
Maximum permitted specific fan power	1.5 W/(I/s)	N .	01/
Specific fan power	0.55 W/(I/s	3)	OK
Minimum permitted heat recovery	73%		
efficiency	0.28/		OK
Heat recovery efficiency Manufacturer/Model	92% Sentinel Ki	inetic Plus B	OK
Commissioning			
Commissioning			
9 Local generation			
9 Local generation Technology type: Photovoltaic system			
9 Local generation Technology type: Photovoltaic system Peak power	0.47 kWp		
9 Local generation Technology type: Photovoltaic system Peak power Orientation	0.47 kWp South		
9 Local generation Technology type: Photovoltaic system Peak power Orientation Pitch	0.47 kWp South Horizontal	ne little	
9 Local generation Technology type: Photovoltaic system Peak power Orientation Pitch Overshading	0.47 kWp South	ery little	
9 Local generation Technology type: Photovoltaic system Peak power Orientation Pitch	0.47 kWp South Horizontal	ery little	

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						



Property Reference	Greggs Bakery Iss						Issued on Date 05/05/2023						
Assessment Reference	nce Greggs-A-2B4P-Be Green Prop Type Ref Greg						Greggs I	Greggs Bakery					
Property	0	Gregs Bake	ery D12 - Tov	nhouse, D12, Twick	enham, ⁻	Thames Va	lley						
SAP Rating				92 A	DE	P	1.94	4		ſER	9.2	20	
Environmental			92 A 98 A		DER < TER		4				.91		
CO ₂ Emissions (t/year)				90 A 0.13			20.4	40		TFEE			
Compliance Check						=⊏ DFEE < TFE		40				.45	
% DPER < TPER				See BREL				00		PER		.00	
/ DPER > IPER				54.49		ER	21.8	83		IPER	47	.96	
Assessor Details	Mr. Ke	eith Ketchl	еу							Assesso	r ID Q	303-0	001
Client													
SUMMARY FOR INPL	JT DATA	FOR: N	ew Build (As Designed)									
Drientation				Northeast									
Property Tenture				ND									
ransaction Type				6									
errain Type				Suburban									
.0 Property Type				Flat, Detached									
Position of Flat				Mid-floor flat									
Which Floor				2									
.0 Number of Storeys				1									
.0 Date Built				2023									
.0 Sheltered Sides				2									
.0 Sunlight/Shade				Average or unknow	wn								
5.0 Thermal Mass Parame	eter			Precise calculation									
Thermal Mass				N/A					k	J/m²K			
7.0 Electricity Tariff	<i></i>			Standard									
Smart electricity meter	fitted			Yes									
Smart gas meter fitted				Yes									
7.0 Measurements					н	leat Loss F	Perimete	er Inf	ernal Flo	or Area	Average	Stor	ey Heigh
				Basem Ground fl	ent:	0.00 27.00	m		0.00 n 72.00 i	1 ²	-	0.00 i 2.50 i	n
				1st Sto	rey:	12.70) m		54.00 ı	m²		2.50 ı	n
				2nd Sto 3rd Sto	rey:	12.70 0.00	m		31.00 ı 0.00 n	1 ²		2.50 ı 0.00 ı	n
				4th Sto 5th Sto		0.00 0.00			0.00 n 0.00 n			ו 00.0 ו 00.0	
				6th Sto 7th Sto		0.00 0.00			0.00 n 0.00 n			ו 00.0 ו 00.0	
3.0 Living Area				25.00					m	l			
9.0 External Walls Description	Туре	Con	struction		U-V:	alue Kappa	Gross	Nett Area	Shelter	Shelter	Opening	s Area	Calculatio
External Wall 1	Cavity Wall	Cav	ity wall : plastert	poard on dabs, AAC block	(W/n	n²K) (kJ/m²K			Res 0.00	None	16.20		Type or Gross Are
		filled	d cavity, any out	side structure									
0.1 Party Walls Description	Туре	9	Constru	ction				U-Value	Kappa	Area	Shelter	S	helter
Party Wall 1		l Cavity wi		pard on dabs mounte	d on cer	ment rende	r on both	(W/m²K)	(kJ/m ² K) 45.00	(m²) 55.65	Res 0.00		None
		Sealing		AC blocks, cavity				5.00		- 0.00			
9.2 Internal Walls			A .										
Description			Construc	tion							Kap (kJ/n	n²K)	Area (m
Internal Wall 1			Dense blo	ck, plasterboard on o	labs						75.	00	43.22
I0.1 Party Ceilings Description			Construc	tion							Kap		Area (m



Party Ceiling 1		In-situ (concrete slab supported by profiled metal d	eck, carpete	ed			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	Туре	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1 Opening Type 2	Manufacturer Manufacturer	Solid Door Window	Double Low-E Soft 0.05 Double Low-E Soft 0.05		Air Filled Air Filled	0.63 0.63	Wood Wood	0.80 0.80	1.30 1.30
13.0 Openings									
Name Opening	Opening Ty Opening Typ	pe pe 2	Location External Wall 1	Orient Eas		Area (2.5			t ch D
Opening Patio Door	Opening Typ Opening Typ	be 2	External Wall 1 External Wall 1	Ea: Ea:		2.5 5.6			D D
Opening	Opening Typ	be 2	External Wall 1	We	st	3.6	0		D
Front Door	Opening Typ	pe 1	External Wall 1	Nor	th	2.0	0		0
14.0 Conservatory			None						
15.0 Draught Proofing			100			%			
16.0 Draught Lobby			No						
			Calaulata Dridra						
17.0 Thermal Bridging 17.1 List of Bridges			Calculate Bridges						
Bridge Type			Source Type Length	Psi		Reference	:		Imported
E7 Party floor between dy E16 Corner (normal)	wellings (in block	s of flats)	Gov Approved Scheme27.00Gov Approved Scheme10.00	0.00 0.00	0.00 0.00				Yes Yes
Y-value			0.00			W/m²K			
8.0 Pressure Testing			Yes						
Designed AP ₅₀			3.00			 	²) @ 50 Pa		
-			Yes) @ 30 Fa	I	
Property Tested?									
Test Method			Blower Door]	2) O 50 D-		
As Built AP ₅₀			0.10				²) @ 50 Pa		
19.0 Mechanical Ventilation Mechanical Ventilation	ı								
Mechanical Ventilation	tion System Pres	ent	Yes			7			
Approved Installation	•		No			Ì			
Mechanical Ventilat			Database						
Туре			Balanced mechanical ventilation with	heat recove	rv				
MV Reference Num	her		500167		.,				
Configuration			2						
-	od		Insulated Ducts						
MVHR Duct Insulat	eu								
Manufacturer SFP			0.55						
Duct Type			Rigid						
MVHR Efficiency			92.00						
Wet Rooms			2						
SFP from Installer (U U	Certificate	No			_			
MVHR System Loc			Inside heated envelope (installed exc	lusively)					
Duct Installation Sp	ecification		Level 1						
20.0 Fans, Open Fireplaces	s, Flues								
21.0 Fixed Cooling System			No						
22.0 Lighting									
No Fixed Lighting			No						
No Pixou Eighting			Name Efficacy		wer	Capa	• •	-	unt



4.0 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	
5.0 Main Heating 2	None	
6.0 Heat Networks	None	

Efficiency Percentage Of Heat Efficiency type Heat Source Fuel Type Heating Use Heat Electrical Fuel Factor Heat Power Ratio Heat source 1 None Heat source 2 None Heat source 3 None None None

Heat source 4 Heat source 5 28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
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 Description Shower Type Flow Rate Rated Power Connected Connected To [l/min] [kW] Shower Vented hot water system 7.00 Storage System No 28.3 Waste Water Heat Recovery System Internal Store 29.0 Hot Water Cylinder No Cylinder Stat No Cylinder In Heated Space Independent Time Control No Insulation Type Measured Loss 245.00 Cylinder Volume L kWh/day 1.92 Loss In Airing Cupboard No 31.0 Thermal Store None 32.0 Photovoltaic Unit One Dwelling Export Capable Meter? Yes Yes Connected To Dwelling Diverter No Battery Capacity [kWh] 0.00 PV Cells kWp Orientation Elevation Overshading FGHRS **MCS** Certificate Overshading MCS Panel Factor Certificate Manufacturer Reference 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 Jun Jul Oct Dec Jan Feb Mar Apr May Aug Sep Νον 35.0 Special Features Fuel Saved Energy Fuel Used Description Monthly Air Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Energy Special Change Rates Technologies Saved Used Type CO2 saving 0.00 0.00 feature

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

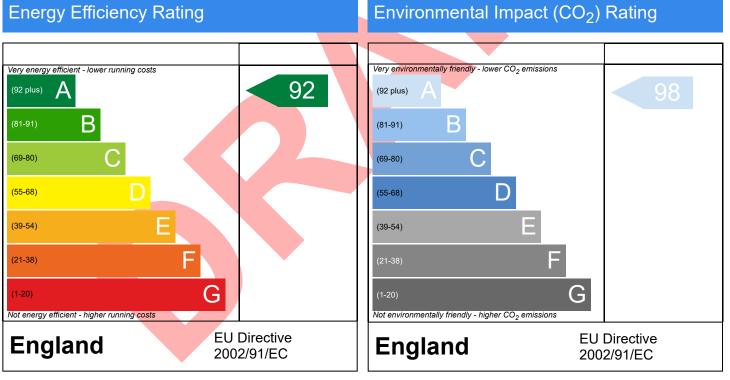


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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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. 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.

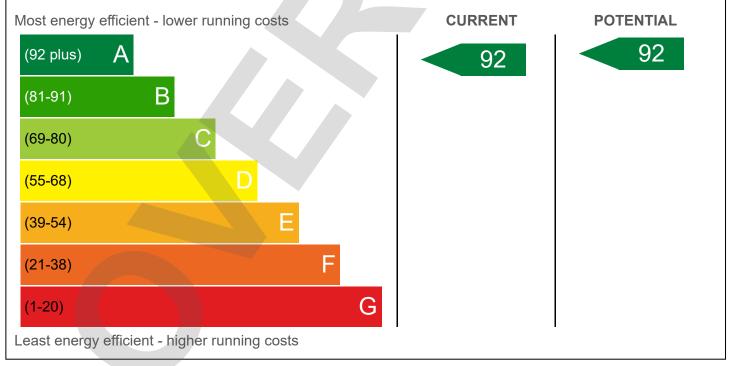


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Detached
Floor Area [m ²]	72

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.





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 transmi	ttance 0.15 W/m²K		Very Good
Windows	High performance glazing	Good		
Main heating	Air source heat pump, ra	Good		
Main heating controls	Programmer, room therm	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 CO₂ 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



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 measureTypical Yearly SavingPotential Rating after measure installedCumulative savings (per year)Cum Potential Potential
--

Estimated energy use and potential savings



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	



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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK
and roof windows				
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 ² K]		
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 ² K]
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

Building part 1 -	Main Dwelling: Thermal bridging ca	lculated from linear thermal	transmittances for eacl	h junction
Main element Junction detail Source Psi value Dra			Drawing /	
			[W/mK]	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
Party wall	dwellings (in blocks of f P2: Intermediate floor w dwelling		SAP table default	0 (!)	
Party wall	P5: Roof (insulation at I	rafter level)	SAP table default	0.48	
3 Air permeabil	ity (better than typically	v expected	values are flagged with a	subsequent (!))	
	tted air permeability at 50		$8 m^3/hm^2$		
Dwelling air pern			3 m ³ /hm ² , Design value (!	!)	OK
	test certificate reference		1	1	
4 Space heating					
	stem 1: Heat pump with		r underfloor heating - Electr	icity	
Efficiency		320.0%			
Emitter type		Radiators			
Flow temperature	e	35°C			
System type		Heat Pump			
Manufacturer		Daikin Euro		A/	
Model		ERLQ0080	CAV3 + EHVH08SU26CB6\	IV	
Commissioning					
	ing system: N/A				
Fuel		N/A			
Efficiency		N/A			
Commissioning					
5 Hot water					
Cylinder/store -	type: N/A				
Capacity		N/A			
Declared heat lo	ss	N/A			
Primary pipewor	k insulated	N/A			
Manufacturer					
Model					
Commissioning					
	at recovery system 1 -	type: N/A			
Efficiency					
Manufacturer					
Model					
6 Controls					
	- type: Programmer, roor	n thermosta	at and TRVs		
Function	-,				
Ecodesign class					
Manufacturer					
Model					
Water heating -	type: N/A	1			
Manufacturer	21				
Model					
7 Lighting	to d light opures affing	75 los /14/			
	ted light source efficacy	75 lm/W			OK
Lowest light sour		85 lm/W			ОК
External lights co	וטווות	N/A			
8 Mechanical ve	entilation				
System type: Ba	alanced whole-house me		ntilation with heat recovery		
	tted specific fan power	1.5 W/(l/s)			
Specific fan pow		0.55 W/(I/s)		ОК
	ted heat recovery	73%			
efficiency	-				
Heat recovery ef	ficiency	92%			ОК
Manufacturer/Mo			netic 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.				
		Assessor ID:		
Name: Date:		Date:		
b. Client Declaration				
N/A				



Property Reference	Greg	gs Bakery						Issu	ed on Dat	.e 0!	5/05/2023	
Assessment Reference	Greg	gs-C-TH-Be Green			Prop	Туре	Ref	Gregg	s Bakery			
Property	Greg	s Bakery D12 - Towr	nhouse, D12, Twicker	ham, Tha	mes Valley	/						
SAP Rating			90 B	DER		2.05			TER		7.73	
Environmental			90 B 98 A		< TER	2.05)		TER		73.48	
CO ₂ Emissions (t/year)			96 A 0.22	DFEE		31.6	20		TFEE		27.37	
Compliance Check			See BREL		E < TFEE	31.0	50				-15.47	
% DPER < TPER			44.23	DPER		22.3	20		TPER		40.02	
			44.23	DIEN		22.3	2				40.02	
Assessor Details	Mr. Keith	Ketchley							Assess	or ID	Q303-00	D1
Client												
SUMMARY FOR INPL	JT DATA FC	R: New Build (A	s Designed)									
Drientation			Unknown									
Property Tenture			ND									
ransaction Type			6									
errain Type			Suburban									
.0 Property Type			House, Mid-Terrace									
Which Floor			0									
.0 Number of Storeys			3									
3.0 Date Built			2023									
.0 Sheltered Sides			0									
.0 Sunlight/Shade			Average or unknown									
.0 Thermal Mass Parame	eter		Precise calculation									
Thermal Mass			N/A						kJ/m²K			
7.0 Electricity Tariff			Standard									
Smart electricity meter	fitted		Yes									
Smart gas meter fitted			Yes									
.0 Measurements			L									
			Basemer Ground floo 1st Store 2nd Store 3rd Store 4th Store 5th Store 6th Store 7th Store	nt: pr: py: py: py: py: py: py: py: py: py:	Loss Per 0.00 m 23.87 m 23.87 m 12.70 m 0.00 m 0.00 m 0.00 m 0.00 m		r Int	ternal F 0.00 41.0 54.0 31.0 0.00 0.00 0.00 0.00 0.00	0 m ² 0 m ² 0 m ²) m ²) m ²) m ²	Aver	age Store 0.00 m 2.50 m 2.50 m 2.50 m 0.00 m 0.00 m 0.00 m 0.00 m	
3.0 Living Area			20.50						m²			
0.0 External Walls												
Description	Туре	Construction			Kappa ((kJ/m²K) A		Nett Area (m²)	Shelter Res	Shelte	r Ope	nings Area	Calculatio Type
External Wall 1	Cavity Wall	Cavity wall : plasterbo filled cavity, any outsion	ard on dabs, AAC block, de structure	0.15		50.85	25.53	0.00	None	25	.32 Enter	Gross Ar
.1 Party Walls												
Description	Туре	Construc	tion				U-Value (W/m ² K)			Shelte Res	r Sh	elter
Party Wall 1	Filled Ca Edge Sea		ard on dabs mounted C blocks, cavity	on cemer	t render o	n both		45.00			N	one
0.0 External Roofs	_						_					
Description	Туре	Construction			-Value Ka V/m²K)(kJ/			Nett Area		Shelter C Factor	alculation Type	Openin
External Roof 1	External Fla Roof	it Plasterboard, i	nsulated flat roof	-		.00	24.10	(m²) 0.00	None		nter Gross Area	0.00
0.2 Internal Ceilings												
Description Internal Ceiling 1		Storey +1	Construction Plasterboard ceilir	n carnet	d chiphoa	rd flor	or					(m²) .80
			I INSTELLOUTU CEIIII	iy, caipeli	va ouihnog	100 III					40	



11.0 Heat Loss Floors Description	Туре	Storey Index	Construction		U-Val	ue s	Shelter Code	She		ba Area (m ^a
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete flo	or, carpeted	(W/m) 0.12		None		ctor (kJ/m 00 75.0	
I2.0 Opening Types Description	Data Source	Туре	Glazing		Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1 Opening Type 2	Manufacturer Manufacturer	Half Glazed I Window	Door Double Low-E Double Low-E			Air Filled Air Filled	0.63 0.63	Wood Wood	0.80 0.80	1.30 1.30
13.0 Openings Name Opening Opening Door	Opening Ty Opening Typ Opening Typ Opening Typ	be 2 be 2	Location External Wall 1 External Wall 1 External Wall 1		Orient We Eas Eas	st st	Area (14.8 7.9 2.5	9 0		tch 0 0 0
14.0 Conservatory			None				7			
15.0 Draught Proofing			100				%			
16.0 Draught Lobby			No							
17.0 Thermal Bridging			Calculate Bridges				7			
17.1 List of Bridges										
Bridge Type E5 Ground floor (normal E6 Intermediate floor wit E18 Party wall between P3 Party wall - Intermedi (in blocks of flats)	hin a dwelling dwellings	Ta Ta Ta	b urce Type ble K1 - Default ble K1 - Default ble K1 - Default ble K1 - Default	Length 8.59 25.40 30.00 19.20	Psi 0.32 0.14 0.24 0.00	Adjusted 0.32 0.14 0.24 0.00	Reference			Imported Yes Yes Yes No
P2 Party wall - Intermedi P5 Party wall - Roof (ins			ble K1 - Default ble K1 - Default	33.00 12.60	0.00 0.48	0.00 0.48				No No
Y-value			0.17				W/m²K			
18.0 Pressure Testing			Yes							
Designed AP50			3.00				m³/(h.m	²) @ 50 Pa	1	
Property Tested?			Yes							
Test Method			Blower Door							
As Built AP50			0.10				m³/(h.m	²) @ 50 Pa	1	
19.0 Mechanical Ventilation	n									
Mechanical Ventilation							_			
Mechanical Ventila		ent	Yes							
Approved Installati			No							
Mechanical Ventila	tion data Type		Database							
Туре			Balanced mechanic	al ventilation with h	neat recove	ry				
MV Reference Nur	nber		500167							
Configuration			2							
MVHR Duct Insula	ted		Insulated Ducts							
Manufacturer SFP			0.55							
Duct Type			Rigid							
MVHR Efficiency			92.00							
Wet Rooms			2							
SFP from Installer	Ū.	ertificate	No							
MVHR System Loc			Inside heated envelo	ope (installed exclu	usively)					
Duct Installation Sp			Level 1							
20.0 Fans, Open Fireplaces			No							
21.0 Fixed Cooling System 22.0 Lighting	l		No							
No Fixed Lighting			No							
			Name Lighting 1	Efficacy 85.00		wer 5	Capa 42			ount 10
							_			



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

26.0 Heat Networks

Heat Source Fuel Type Heating Use Efficiency Percentage Of Heat Heat Electrical Fuel Factor Efficiency type Heat Power Ratio Heat source 1 None Heat source 2 Heat source 3 None None Heat source 4 None

Heat source 5 28.0 Water Heating

None

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

None

28.1 Showers



Descripti	on		s	hower Type	•				w Rate /min]		wer C	onnected	Connected	То
Shower			N	ented hot wa	ater syst	em			7.00	[kW]		No	Storage Sys	tem
28.3 Waste V	Vater Heat Re	covery Sy	/stem											
29.0 Hot Wat	er Cylinder				Interna	l Store								
Cylinder S	Stat				No									
Cylinder I	n Heated Spa	ce			No									
Independ	ent Time Cont	rol			No									
Insulation	Туре				Measu	red Loss								
Cylinder \	Volume				245.00							L		
Loss					1.92							kWh/day	/	
In Airing (Cupboard				No									
31.0 Therma	I Store				None									
32.0 Photovo	oltaic Unit				One Dv	velling								
Export Ca	apable Meter?				Yes									
Connecte	d To Dwelling				Yes									
Diverter					No									
Battery C	apacity [kWh]				0.00									
PV	Cells kWp	0	rientation	Elevation	Ov	rershading	FGHRS	;	MCS Ce	ertificate	Overs Facto	or Ö	MCS Certificate Reference	Panel Manufacturer
0.66	6	S	outh	Horizontal	No	ne Or Little	No		No		1.00		Reference	
34.0 Small-s	cale Hydro				None									
Electricity	Generated				0.00									
Apportion	ed				0.00							kWh/Yea	ar	
Connecte	d to dwelling's	electricity	meter		Yes									
Electricity	Generation				Annual									
Jan	Feb	М	ar	Apr	Мау	Jun		Jul	Aug	g S	ер	Oct	Nov	Dec
35.0 Special	Features													
Energy Saved	Fuel Saved	Energy Used	Fuel Used	l Descri	ption	Monthl Change		Techr	ecial lologies ype		Mar A	pr May Ju	un Jul Aug S	ep Oct Nov Dec
0.00		0.00						CO2	saving	0.00 0.00	0.000	.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

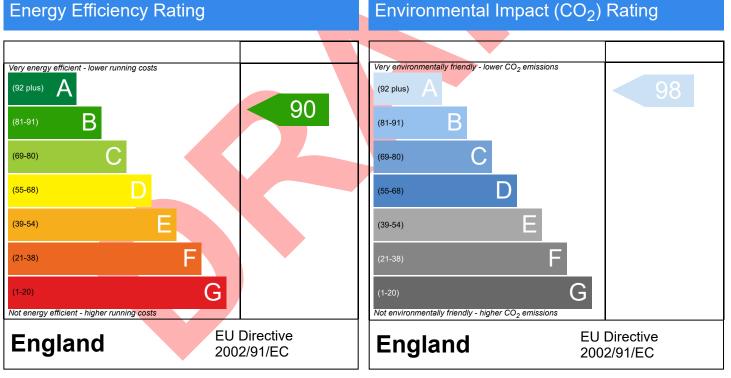


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

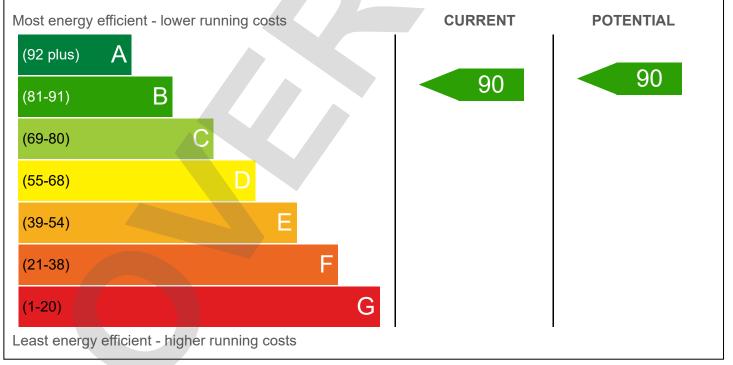


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m ²]	126

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.





Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good		
Feature	Description	Description				
Walls	Average thermal transmi	ttance 0.15 W/m²K		Very Good		
Roof	Average thermal transmi	ttance 0.11 W/m²K		Very Good		
Floor	Average thermal transmittance 0.12 W/m²K Very Good					
Windows	High performance glazin	Good				
Main heating	Air source heat pump, ra	Air source heat pump, radiators, electric				
Main heating controls	Programmer, room therm	Programmer, room thermostat and TRVs				
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 CO₂ 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	СО	emissions	for	this	dwellings	is:	
-----	-----------	----	-----------	-----	------	-----------	-----	--

0.2 per year



With the recommended measures the potential CO emissions could be:

per year

0

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

Estimated energy use and potential savings



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				

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 - Towr	nhouse, 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	ly	
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 ene		
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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK						
and roof windows										
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 ² K]							
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 ² K]						
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						

Building part 1 -	Main Dwelling: Thermal bridging ca	lculated from linear thermal	transmittances for eac	h 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
Party wall	dwellings (in blocks of f P2: Intermediate floor v dwelling		SAP table default	0 (!)	
Party wall	P5: Roof (insulation at	rafter level)	SAP table default	0.48	
3 Air permeabil	ity (better than typically	v expected	values are flagged with a	subsequent (!))	
	tted air permeability at 50		$8 m^3/hm^2$		
Dwelling air pern			3 m ³ /hm ² , Design value (!)	OK
	test certificate reference		1	-1	
4 Space heating					
	vstem 1: Heat pump with		r underfloor heating - Electr	ricity	
Efficiency		318.8%			
Emitter type		Radiators			
Flow temperatur	e	35°C			
System type		Heat Pump			
Manufacturer		Daikin Euro		Δ1	
Model		ERLQ0080	CAV3 + EHVH08SU26CB6	VV	
Commissioning	Line N1/A				
	ting system: N/A	N1/A			
Fuel		N/A			
Efficiency		N/A			
Commissioning					
5 Hot water					
Cylinder/store -	type: N/A				
Capacity		N/A			
Declared heat lo	SS	N/A			
Primary pipewor	k insulated	N/A			
Manufacturer					
Model					
Commissioning					
	at recovery system 1 -	type: N/A			
Efficiency					
Manufacturer					
Model					
6 Controls					
	- type: Programmer, roor	n thermosta	at and TRVs		
Function	<u>, , , , , , , , , , , , , , , , , , , </u>				
Ecodesign class					
Manufacturer					
Model					
Water heating -	type: N/A				
Manufacturer					
Model					
7 Lighting		•			
7 Lighting	tod light pourse office at	75 lm/11/			
	ted light source efficacy	75 Im/W 85 Im/W			OK
Lowest light sour		N/A			OK
v		IN/A			
8 Mechanical ve					
			ntilation with heat recovery		
	tted specific fan power	1.5 W/(l/s)			
Specific fan pow	er	0.55 W/(l/s)		OK
	ted heat recovery	73%			
efficiency					
Heat recovery ef		92%			OK
Manufacturer/Mo	odel	Sentinel Ki	netic 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		
	ed upon the design in signed" assessment, x 1 (documentary evi	dence) schedules the minimum
Signed:		Assessor ID:
Name:		Date:
b. Client Declaration		
N/A		



Property Reference		Greggs E	Bakery								Issu	ied on Da	te	05/05/	2023	
Assessment Reference	Greggs-D-TH-Be Green Prop Type Ref Gregg								reggs Bakery							
Property					nhouse, D	12, Twickenl	ham, Tha	ames Val	ley							
SAP Rating					89 B		DER		2.1	8		TER		8.0		
Environmental					98 A			R < TER						72.		
CO ₂ Emissions (t/year)					0.24		DFEE		32.	87		TFEE		29.	.02	
Compliance Check					See BRE	EL	% DFE	E < TFE	E					-13	3.29	
% DPER < TPER					43.06		DPER		23.	69		TPER		41.	.60	
Assessor Details	Mr. K	Keith Keto	hley									Assess	or ID	Q3	03-000	1
Client			,													
SUMMARY FOR INPL		A FOR:	New	Build (A	As Desic	ined)										
Orientation					Unknow	n										
Property Tenture					ND											
Transaction Type					6											
Terrain Type					Suburba											
1.0 Property Type						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 Parame	eter				Precise	calculation										
Thermal Mass					N/A							kJ/m²K				
7.0 Electricity Tariff					Standard	ł										
Smart electricity meter f	fitted				Yes											
Smart gas meter fitted					Yes											
7.0 Measurements																
					(Basemen Ground floo 1st Store 2nd Store 3rd Store 4th Store 5th Store 6th Store 7th Store	t: r: y: y: y: y: y: y: y:	t Loss P 0.00 8.59 12.70 12.70 0.00 0.00 0.00 0.00	m m m m m m m m	ər Inf	0.00 41.0 54.0 31.0 0.00 0.00 0.00	Floor Area 0 m ² 10 m ² 10 m ² 0 m ² 0 m ² 0 m ² 0 m ² 0 m ² 0 m ²	a Av		Storey 0.00 m 2.50 m 2.50 m 2.50 m 0.00 m 0.00 m 0.00 m 0.00 m	Height
8.0 Living Area					20.50							m²				
9.0 External Walls																
Description	Туре	с	onstru	ction				e Kappa) (kJ/m²K)		Nett Area 2) (m ²)	Shelter Res	Shelt	er C	penings	Area Ca	alculatior ype
External Wall 1	Cavity Wal				oard on dabs ide structure	s, AAC block,	0.15	60.00	50.85	25.53	0.00	Non	е	25.32	Enter G	Sross Area
9.1 Party Walls Description	Тур			Construc						U-Value			n She	lter	She	lter
Party Wall 1		ed Cavity e Sealing			ard on dat C blocks, o	os mounted o cavity	on ceme	nt render	on bot	(W/m²K) h 0.00	(kJ/m² 45.00				Noi	าย
10.0 External Roofs																
Description	Туре		Con	struction	l			J-Value N/m²K)(I		Gross Area(m²)	Nett Area	Shelter Code	Shelter Factor		lation0	pening
External Roof 1	Extern Roof	al Plane	Plas	terboard,	insulated a	at ceiling lev	-	0.11	9.00	70.60	(m²) 0.00	None		Enter	•	0.00
10.2 Internal Ceilings																
Description Internal Ceiling 1			storey ∙1			ruction rboard ceiling	g, carpet	ed chipb	oard flo	or					Area (54.0	



Internal Ceiling 2	+2		P	lasterboard ceiling	carpeted chipt	oard floor				4	2.00
11.0 Heat Loss Floors					,, -a. p = to a on pr						
Description	Type Sto	orey Index	Co	nstruction		U-Va (W/n		Shelter Code	Shelt Facto		a Area (m
Heatloss Floor 1	Ground Floor - Solid Lor	west occup	pied Sus	spended concrete floor	, carpeted	0.7		None	0.00		
12.0 Opening Types Description	Data Source Ty	уре		Glazing		Glazing		G-value	Frame	Frame	U Value
Opening Type 1 Opening Type 2		alf Glaze /indow	ed Door	Double Low-E \$ Double Low-E \$		Gap	Type Air Filled Air Filled		Type Wood Wood	Factor 0.80 0.80	(W/m²K 1.30 1.30
13.0 Openings											
Name Opening Opening Door	Opening Type Opening Type 2 Opening Type 2 Opening Type 1	2	Ext Ext	c ation ernal Wall 1 ernal Wall 1 ernal Wall 1		Ea	tation est ast ast	Area (14.8 7.90 2.53	9)		tch 0 0 0
14.0 Conservatory			Nor	ie							
15.0 Draught Proofing			100					%			
16.0 Draught Lobby			No					Ξ			
17.0 Thermal Bridging 17.1 List of Bridges			Cal	culate Bridges							
Bridge Type E5 Ground floor (norma E6 Intermediate floor wi E18 Party wall between P3 Party wall - Intermed (in blocks of flats) P2 Party wall - Intermed	ithin a dwelling dwellings diate floor between dw	-	Table K1 Table K1 Table K1	Type - Default - Default - Default - Default - Default - Default	Length 8.59 25.40 30.00 19.20 33.00	Psi 0.32 0.14 0.24 0.00	Adjusted 0.32 0.14 0.24 0.00 0.00	l Reference:			Importe Yes Yes Yes No
P5 Party wall - Roof (ins				- Default	12.60	0.48	0.48				No
Y-value			0.13	3				W/m²K			
18.0 Pressure Testing			Yes								
Designed AP ₅₀			3.0)				m³/(h.m	²) @ 50 Pa		
Property Tested?			Yes								
Test Method			Blo	wer Door							
As Built AP 50			0.1)				m³/(h.m	²) @ 50 Pa		
19.0 Mechanical Ventilation	on										
Mechanical Ventilation	า										
Mechanical Ventil	ation System Present		Yes								
Approved Installat			No					_			
Mechanical Ventil	ation data Type			abase							
Туре				anced mechanical	ventilation with	heat recov	ery				
MV Reference Nu	mber		500	167							
Configuration			2					_			
MVHR Duct Insula	ated			Ilated Ducts							
Manufacturer SFF			0.5								
Duct Type			Rig					_			
MVHR Efficiency			92.0	00				_			
Wet Rooms			2					_			
	Commissioning Certi	ificate	No					_			
MVHR System Lo				de heated envelop	be (installed excl	usively)		_			
Duct Installation S	Specification		Lev	el 1							
20.0 Fans, Open Fireplace											
21.0 Fixed Cooling Syster	n		No								
22.0 Lighting											
No Fixed Lighting				Name ghting 1	Efficacy 85.00	P	ower 5	 Capa 42			ount 10



4.0 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	
5.0 Main Heating 2	None	
6.0 Heat Networks	None	
	L	

Efficiency Percentage Of Heat Efficiency type Heat Source Fuel Type Heating Use Heat Electrical Fuel Factor Heat Power Ratio Heat source 1 None Heat source 2 None Heat source 3 None None None

Heat source 4 Heat source 5 28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
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 Description Shower Type Flow Rate Rated Power Connected Connected To [l/min] [kW] Shower Vented hot water system 7.00 Storage System No 28.3 Waste Water Heat Recovery System Internal Store 29.0 Hot Water Cylinder No Cylinder Stat No Cylinder In Heated Space Independent Time Control No Insulation Type Measured Loss 245.00 Cylinder Volume L kWh/day 1.92 Loss In Airing Cupboard No 31.0 Thermal Store None 32.0 Photovoltaic Unit One Dwelling Export Capable Meter? Yes Yes Connected To Dwelling Diverter No Battery Capacity [kWh] 0.00 PV Cells kWp Orientation Elevation Overshading FGHRS **MCS** Certificate Overshading MCS Panel Factor Certificate Manufacturer Reference South 0.66 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 Jun Jul Oct Dec Jan Feb Mar Apr May Aug Sep Νον 35.0 Special Features Fuel Saved Energy Fuel Used Description Monthly Air Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Energy Special Change Rates Technologies Saved Used Type CO2 saving 0.00 0.00 feature

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

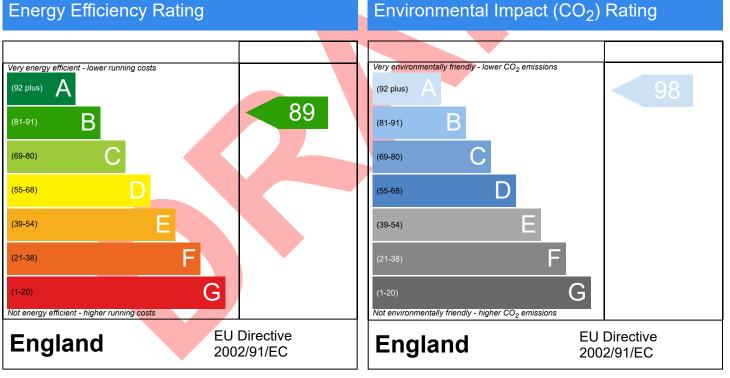


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

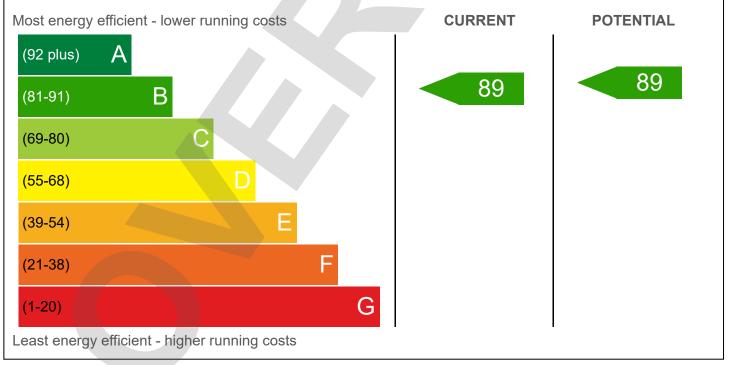


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	House, Mid-Terrace
Floor Area [m ²]	126

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.





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 transmi	ttance 0.15 W/m²K		Very Good
Roof	Average thermal transmi	ttance 0.11 W/m²K		Very Good
Floor	Average thermal transmi	ttance 0.12 W/m²K		Very Good
Windows	High performance glazing	g		Good
Main heating	Air source heat pump, ra	diators, electric		Very Good
Main heating controls	Programmer, room therm	nostat 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 CO₂ 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	СО	emissions	for	this	dwellings	is:	
-----	-----------	----	-----------	-----	------	-----------	-----	--

0.2 per year



With the recommended measures the potential CO emissions could be:

per year

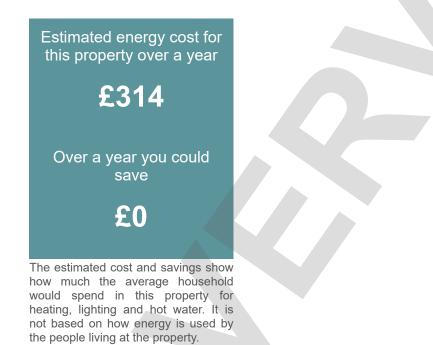
0

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

Estimated energy use and potential savings



Contacting the assessor and the accreditation scheme

As	sessor 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	

Assessment details		
Related party disclosure Employed by the professional dealing 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 - Towr	nhouse, 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	1Y	
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 ene	rgy 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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK
and roof windows				
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 ² K]					
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 ² K]					
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 Draw					
			[W/mK]	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 typical	v expected	values are flagged with a subsequent (!	11			
Maximum permitted air permeability at 5		8 m ³ /hm ²				
Dwelling air permeability at 50Pa	01 a	3 m ³ /hm ² , Design value (!) OK				
Air permeability test certificate reference		1	ÖK			
4 Space heating						
Main heating system 1: Heat pump with		r underfloor heating - Electricity				
Efficiency	304.5%					
Emitter type	Radiators					
Flow temperature	35°C					
System type	Heat Pum					
Manufacturer	Daikin Eur					
Model	ERLQ008	CAV3 + EHVH08SU26CB6W				
Commissioning						
Secondary heating system: N/A	N/A					
	N/A					
Efficiency Commissioning	IN/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, roo	m thermosta	at 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		VI Y			
	1					
8 Mechanical ventilation						
System type: Balanced whole-house m		entilation with heat recovery				
Maximum permitted specific fan power	1.5 W/(I/s)	<u>,</u>				
Specific fan power	0.55 W/(l/s	51	OK			
Minimum permitted heat recovery	73%					
efficiency	0.001		01/			
Heat recovery efficiency	92%		OK			
Manufacturer/Model	Sentinel K	inetic Plus B				
Commissioning						
9 Local generation						
Technology type: Photovoltaic system	(1)					
Peak power	0.47 kWp					
Orientation	South					
Pitch	Horizontal					
Overshading	None or ve	ery 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							



Property Reference	Greggs Bak	ery					Issue	ed on Date	05/05	/2023
Assessment Reference	Greggs-F-2	B4P-Be Greer	n		Prop T	ype Ref	Gregg	s Bakery		
Property	Gregs Bake	ery D12 - Town	house, D12, Twicke	nham, Tha	mes Valley					
SAP Rating			89 B	DER		2.69		TER	12	84
Environmental			98 A		< TER	2.03				.05
CO₂ Emissions (t/year)			0.17	DFEE		36.32		TFEE		.58
Compliance Check			See BREL		E < TFEE	50.52				.30
% DPER < TPER			57.02	DPER		29.39		TPER		.38
NOTER THER			57.02	DIER		29.39			00	.50
Assessor Details	Mr. Keith Ketchle	әу						Assessor	D Q3	803-0001
Client										
SUMMARY FOR INPUT D	ATA FOR: N	ew Build (A	s 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 unknow							
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							
			105							
7.0 Measurements			Baseme Ground flo 1st Stor 2nd Stor 3rd Stor 4th Stor 5th Stor 6th Stor 7th Stor	nt: or: ey: ey: ey: ey: ey: ey: ey:	Loss Peri 0.00 m 15.00 m 12.70 m 12.70 m 0.00 m 0.00 m 0.00 m 0.00 m 0.00 m	meter I	nternal Fl 0.00 71.00 54.00 31.00 0.00 0.00 0.00 0.00 0.00 0.00) m ²) m ²) m ²) m ² m ² m ² m ² m ² m ²		Storey Heigh 0.00 m 3.00 m 2.50 m 0.00 m 0.00 m 0.00 m 0.00 m 0.00 m
8.0 Living Area			24.60					m²		
9.0 External Walls Description Type	Con	struction		U-Value	Kappa G	iross Nett Are	a Shelter	Shelter	Opening	s Area Calculati
	y Wall Cavi		ard on dabs, AAC block, le structure		(kJ/m ² K) Ar		Res 0.00	None	17.20	Type Enter Gross Are
9.1 Party Walls										
Description	Туре	Construct	tion				e Kappa () (kJ/m²k		Shelter Res	Shelter
Party Wall 1	Filled Cavity wit Edge Sealing		ard on dabs mounted C blocks, cavity	l on cemer	nt render on		45.00		0.00	None
10.1 Party Ceilings Description		Constructio	on						Kap (kJ/n	
Party Ceiling 1		In-situ conc	rete slab supported	by profiled	metal deck	, carpeted			(KJ /n 90.	
10.2 Internal Ceilings										
Description Internal Ceiling 1	Sto Lov	rey /est occupied	Construction Plasterboard ceili	ng, carpete	ed chipboar	d floor				Area (m²) 54.00



Internal Ceiling 2	L	owest occupied	Plasterboard ceiling, carpe	eted chipboar	d floor				42	2.00
11.0 Heat Loss Floors										
Description Ty	/pe	Storey Index	Construction		U-Valı (W/m²		Shelter Code	Shel Fact		a Area (r K)
Heatloss Floor 1 G	round Floor - Solid	Lowest occupied	Suspended concrete floor, carpete	d	0.12		None	0.0		
12.0 Opening Types										
Description	Data Source	Туре	Glazing	G	Blazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Valu (W/m²k
	Manufacturer Manufacturer	Solid Door Window	Double Low-E Soft 0.0 Double Low-E Soft 0.0			Air Filled Air Filled	0.63 0.63	Wood Wood	0.80 0.80	1.30 1.30
13.0 Openings										
Name Opening Opening Patio Door Opening Opening Front Door	Opening Typ Opening Typ Opening Typ Opening Typ Opening Typ Opening Typ Opening Typ	e 2 e 2 e 2 e 2 e 2 e 2	Location External Wall 1 External Wall 1 External Wall 1 External Wall 1 External Wall 1 External Wall 1		Orienta Nort Nort Nort Wes Sout	h h h st st	Area (2.4 2.4 5.6 2.4 2.4 2.4 2.0	0 0 0 0 0		t ch))))))
14.0 Conservatory			None				7			
15.0 Draught Proofing			100				%			
16.0 Draught Lobby			No							
17.0 Thermal Bridging			Calculate Bridges							
17.1 List of Bridges Bridge Type E5 Ground floor (normal)			i rce Type le K1 - Default	Length 15.00	Psi 0.32	Adjusted 0.32	Reference			Importe Yes
E18 Party wall between dw	ellings		e 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					²) @ 50 Pa		
Property Tested?			Yes				i i	, 0		
Test Method			Blower Door				Ħ			
As Built AP ₅₀			0.10				 m³/(h m	²) @ 50 Pa		
								,0		
19.0 Mechanical Ventilation Mechanical Ventilation										
Mechanical Ventilation	n System Prese	ent	Yes							
Approved Installation			No				i i			
Mechanical Ventilation	n data Type		Database				-			
Туре	, aata 19po		Balanced mechanical ventila	tion with hea	t recove	TV.	4			
MV Reference Numbe	ər		500167			<i>y</i>				
Configuration	51		2							
MVHR Duct Insulated			Insulated Ducts							
MVHR Duct Insulated			0.55				4			
							4			
			Rigid							
MVHR Efficiency			92.00				4			
Wet Rooms			2							
SFP from Installer Co	-	ertificate	No				4			
MVHR System Locati			Inside heated envelope (inst	alled exclusiv	vely)		4			
Duct Installation Spec	cification		Level 1							
20.0 Fans, Open Fireplaces, F	lues									
21.0 Fixed Cooling System			No							
22.0 Lighting							_			
No Fixed Lighting			No Name Effic Lighting 1 85.	acy	Po	ver	 Capa 42	city		unt 0
						-	72	-		-



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

26.0 Heat Networks

Heat Source Fuel Type Heating Use Efficiency Percentage Of Heat Heat Electrical Fuel Factor Efficiency type Heat Power Ratio Heat source 1 None Heat source 2 Heat source 3 None None Heat source 4 None

Heat source 5 28.0 Water Heating

None

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

None

28.1 Showers



Descripti	on		s	hower Type	•				w Rate /min]		wer C	onnected	Connected	То
Shower			N	ented hot wa	ater syst	em			7.00	[kW]		No	Storage Sys	tem
28.3 Waste V	Vater Heat Re	covery Sy	/stem											
29.0 Hot Wat	er Cylinder				Interna	l Store								
Cylinder S	Stat				No									
Cylinder I	n Heated Spa	ce			No									
Independ	ent Time Cont	rol			No									
Insulation	Туре				Measu	red Loss								
Cylinder \	Volume				245.00							L		
Loss					1.92							kWh/day	/	
In Airing (Cupboard				No									
31.0 Therma	I Store				None									
32.0 Photovo	oltaic Unit				One Dv	velling								
Export Ca	apable Meter?				Yes									
Connecte	d To Dwelling				Yes									
Diverter					No									
Battery C	apacity [kWh]				0.00									
PV	Cells kWp	0	rientation	Elevation	Ov	rershading	FGHRS	;	MCS Ce	ertificate	Overs Facto	r	MCS Certificate Reference	Panel Manufacturer
0.47	7	S	outh	Horizontal	No	ne Or Little	No		No		1.00		Reference	
34.0 Small-s	cale Hydro				None									
Electricity	Generated				0.00									
Apportion	ed				0.00							kWh/Yea	ar	
Connecte	d to dwelling's	electricity	meter		Yes									
Electricity	Generation				Annual									
Jan	Feb	М	ar	Apr	Мау	Jun		Jul	Aug	g S	ер	Oct	Nov	Dec
35.0 Special	Features													
Energy Saved	Fuel Saved	Energy Used	Fuel Used	l Descri	ption	Monthl Change		Techr	ecial lologies ype		Mar A	pr May Ju	un Jul Aug S	ep Oct Nov Dec
0.00		0.00						CO2	saving	0.00 0.00	0.000	.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

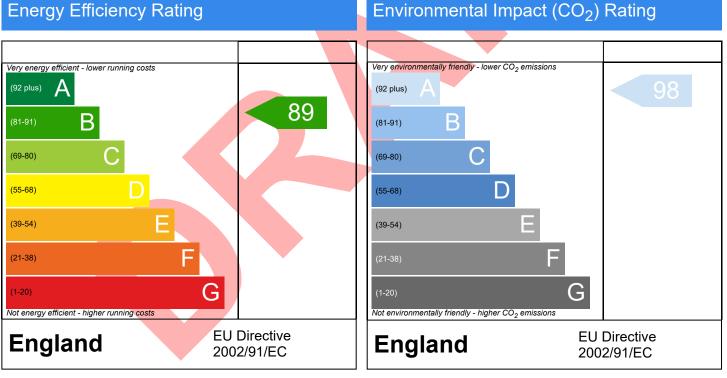


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

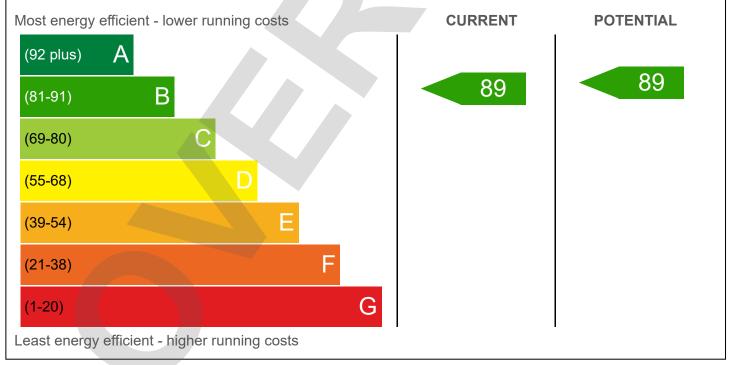


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley				
Report Date	05/05/2023				
Property Type	Flat, Mid-Terrace				
Floor Area [m ²]	71				

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.





Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Very Good	
Feature	Description			Energy Performance
Walls	Average thermal transmit	ttance 0.15 W/m²K		Very Good
Floor	Average thermal transmit	Very Good		
Windows	High performance glazine	Good		
Main heating	Air source heat pump, ra	diators, electric		Very Good
Main heating controls	Programmer, room therm	nostat 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 CO₂ 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 CC) emissions	s 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	Potential Rating	Cumulative	Cumulative
	Yearly	after	savings	Potential
	Saving	measure installed	(per year)	Rating

Estimated energy use and potential savings



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			

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	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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK
and roof windows				
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 ² K]	
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 ² K]
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 permeabili	ty (better than typicall	y expected	values are flagged with a subsec	quent (!))	
Maximum permit	ted air permeability at 5	0Pa	8 m ³ /hm ²		
Dwelling air perm	neability at 50Pa		3 m ³ /hm ² , Design value (!)		OK
Air permeability t	est certificate reference		1		
4 Space heating					
		radiators o	r underfloor heating - Electricity		
Efficiency	I I	307.3%			
Emitter type		Radiators			
Flow temperature	Э	35°C			
System type	a	Heat Pump)		
Manufacturer		Daikin Euro			
Model			CAV3 + EHVH08SU26CB6W		
Commissioning					
Secondary heat	ing system: N/A	1			
Fuel	5-7	N/A			
Efficiency		N/A			
Commissioning					
		I			
5 Hot water					
Cylinder/store -	type: N/A				
Capacity		N/A			
Declared heat los		N/A			
Primary pipework	k insulated	N/A			
Manufacturer					
Model					
Commissioning					
	at recovery system 1 -	type: N/A			
Efficiency					
Manufacturer					
Model					
6 Controls					
	· type: Programmer, rooi	m thermosta	t and TRVs		
Function	type. I regrammer, ree				
Ecodesign class					
Manufacturer					
Model					
Water heating -	type: N/A	1			
Manufacturer					
Model					
		1			
7 Lighting		1			
	ed light source efficacy	75 lm/W			
Lowest light sour		85 lm/W			OK
External lights co	ontrol	N/A			
8 Mechanical ve	entilation				
		echanical ve	ntilation with heat recovery		
	ted specific fan power	1.5 W/(I/s)	<u>,</u>		
Specific fan powe		0.55 W/(I/s)		OK
	ed heat recovery	73%	,		
efficiency	···· ····,				
Heat recovery ef	ficiencv	92%			OK
Manufacturer/Mc			netic Plus B		1
Commissioning					
- Shining		I			

9 Local generation								
Technology type: Photovoltaic system	(1)							
Peak power	0.47 kWp							
Orientation	South	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								
	ed upon the design ir signed" assessment, x 1 (documentary evi	dence) schedules the minimum						
Signed:		Assessor ID:						
Name:		Date:						
b. Client Declaration								
N/A								



Property Reference	G	reggs Ba	kery							Issue	d on Dat	e (05/05/2	2023
Assessment Reference	e G	reggs - 3	F 2B4P - Be G	Green			Pro	p Type I	Ref	Greggs	Bakery			
Property	G	regs Bak	ery D12 - Tow	nhouse, D12, Twic	kenh	am, Thar	nes Vall	еу						
SAP Rating				90 B		DER		2.46			TER		11.2	28
Environmental				98 A		% DER	< TER	2.10					78.	
CO ₂ Emissions (t/year))			0.16		DFEE		30.5	6		TFEE		31.9	
Compliance Check				See BREL		% DFE	E < TFE						4.24	
% DPER < TPER				54.22		DPER		27.0	7		TPER		59.	
Assessor Details	Mr. Ko	ith Ketchl	ev								Assesso	or ID	030)3-0001
Client		III Netoni	су								A330330		0.50	5-0001
SUMMARY FOR INP		FOR: N	ew Build (A	As Designed)										
Prientation			en Bulla (Northeast										
				ND										
Property Tenture				б										
ransaction Type				6 Suburban										
errain Type														
.0 Property Type Position of Flat				Flat, Detached										
				Top-floor flat										
Which Floor				3										
2.0 Number of Storeys				1										
.0 Date Built				2023										
.0 Sheltered Sides				2										
.0 Sunlight/Shade				Average or unknown										
6.0 Thermal Mass Param	leter			Precise calculation										
Thermal Mass				N/A						I	⟨J/m²K			
.0 Electricity Tariff				Standard										
Smart electricity meter	fitted			Yes										
Smart gas meter fitted				Yes										
7.0 Measurements														
				Base Ground 1st S 2nd S 3rd S 4th S 5th S 6th S 7th S	floor torey torey torey torey torey torey	:	Loss P 0.00 r 18.40 12.70 12.70 0.00 r 0.00 r 0.00 r 0.00 r	n m m n n n n	r Int	ernal Fi 0.00 71.30 54.00 31.00 0.00 0.00 0.00 0.00 0.00	m ² m ² m ² m ² m ² m ² m ² m ²	Ave	0 2 2 2 0 0 0 0 0 0 0	Storey He .00 m .50 m .50 m .50 m .00 m .00 m .00 m .00 m
3.0 Living Area				26.00							11²			
						U-Value			Nett Area		Shelte	er Op	enings	Area Calcu
.0 External Walls Description	Туре	Cor	struction					Area(m ²)	(m²)	Res		,	19.20	Type Enter Gross
	Type Cavity Wall	Cav		oard on dabs, AAC blo ide structure	ck,	(W/m²K) 0.15	(kJ/m²K) 60.00	45.90	26.70	0.00	None		13.20	
Description External Wall 1		Cav	ity wall : plasterb	ide structure	ck,				U-Value	Карра	Area	Shelt	er	Shelter
Description External Wall 1 .1 Party Walls	Cavity Wall Type Filled	Cav	ity wall : plasterby d cavity, any outsi Construc th Plasterbo	ide structure		0.15	60.00	45.90	U-Value (W/m²K)	Карра	Area	Shelt Res	er	Shelter None
Description External Wall 1 .1 Party Walls Description	Cavity Wall Type Filled	Cav filler Cavity wi Sealing	ity wall : plasterby d cavity, any outsi Construc th Plasterbo	ition ard on dabs moun C blocks, cavity		n cemen	t render	45.90 on both	U-Value (W/m²K) 0.00	Kappa (kJ/m²K 45.00	Area) (m²) 55.65 Shelter 3	Shelt Res 0.00	er ;)	None ationOpe



									`		
Description		Storey Index	Con	struction						Kappa (kJ/m²K)	
Party Floor 1		Lowest occupied		tu concrete slab supp	ported by profiled	netal deck	, carpeted			90.00	71.30
12.0 Opening Types Description E	Data Source	Туре		Glazing		Glazing	Filling	G-value	Frame	Frame	U Value
- 5 7	Manufacturer Manufacturer	Solid Doo Window	or	Double Low-E Double Low-E		Gap	Type Air Filled Air Filled	0.63 0.63	Type Wood Wood	Factor 0.80 0.80	(W/m²K 1.30 1.30
13.0 Openings											
Name Opening Opening Patio Door Opening Opening Opening Front Door	Opening Ty Opening Typ Opening Typ Opening Typ Opening Typ Opening Typ Opening Typ	be 2 be 2 be 2 be 2 be 2 be 2 be 2 be 1		Location External Wall 1 External Wall 1 External Wall 1 External Wall 1 External Wall 1 External Wall 1 External Wall 1		Orient Nor Nor Ea Ea Sou Sou	th th th st st th	Area 2.4 2.4 5.6 2.4 2.4 2.0 2.0	0 0 0 0 0 0		tch 0 0 0 0 0 0 0 0
14.0 Conservatory				None				7			
15.0 Draught Proofing				100				%			
16.0 Draught Lobby				No							
17.0 Thermal Bridging 17.1 List of Bridges Bridge Type E7 Party floor between dwel	lings (in block	s of flats)	Gov	Calculate Bridges rce Type Approved Scheme	Length 18.40	Psi 0.00	0.00	Reference	:		Importe Yes
E16 Corner (normal) Y-value				Approved Scheme 0.00	10.00	0.00	0.00	W/m²K			Yes
18.0 Pressure Testing				Yes				 7			
Designed AP ₅₀				3.00				 m ³ /(h m	1²) @ 50 P	a	
Property Tested?				Yes					. / @ 001	u	
Test Method				Blower Door				4			
As Built AP50				0.10				 m³/(h.m	1²) @ 50 P	а	
19.0 Mechanical Ventilation Mechanical Ventilation Mechanical Ventilation Approved Installation	System Pres	ent		Yes							
Mechanical Ventilation	data Type			Database				4			
Туре	adda 1990			Balanced mechanica	al ventilation with I	neat recove	erv	i i			
MV Reference Numbe	r			500167			.,	i i			
Configuration				2				f			
MVHR Duct Insulated				Insulated Ducts				i i			
Manufacturer SFP				0.55				i i			
Duct Type				Rigid				i i			
MVHR Efficiency				92.00				ī			
Wet Rooms			İ	2				Ī			
SFP from Installer Con	nmissioning C	ertificate	i	No							
MVHR System Locatio	on		İ	Inside heated envelo	ope (installed excl	usively)		Ξ			
Duct Installation Speci	fication		İ	Level 1							
20.0 Fans, Open Fireplaces, F	lues										
21.0 Fixed Cooling System				No							
22.0 Lighting No Fixed Lighting				No Name Lighting 1	Efficacy 85.00		wer 5	Cap	acity 25		ount 10
24.0 Main Heating 1				Database							



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

26.0 Heat Networks

Heat Source Fuel Type Heating Use Efficiency Percentage Of Heat Heat Electrical Fuel Factor Efficiency type Heat Power Ratio Heat source 1 None Heat source 2 Heat source 3 None None Heat source 4 None

Heat source 5 28.0 Water Heating

None

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

None

28.1 Showers



Descripti	on		s	hower Type	•				w Rate /min]		wer C	onnected	Connected	То
Shower			N	ented hot wa	ater syst	em			7.00	[kW]		No	Storage Sys	tem
28.3 Waste V	Vater Heat Re	covery Sy	/stem											
29.0 Hot Wat	er Cylinder				Interna	l Store								
Cylinder S	Stat				No									
Cylinder I	n Heated Spa	ce			No									
Independ	ent Time Cont	rol			No									
Insulation	Туре				Measu	red Loss								
Cylinder \	Volume				245.00							L		
Loss					1.92							kWh/day	/	
In Airing (Cupboard				No									
31.0 Therma	I Store				None									
32.0 Photovo	oltaic Unit				One Dv	velling								
Export Ca	apable Meter?				Yes									
Connecte	d To Dwelling				Yes									
Diverter					No									
Battery C	apacity [kWh]				0.00									
PV	Cells kWp	0	rientation	Elevation	Ov	rershading	FGHRS	;	MCS Ce	ertificate	Overs Facto	r	MCS Certificate Reference	Panel Manufacturer
0.47	7	S	outh	Horizontal	No	ne Or Little	No		No		1.00		Reference	
34.0 Small-s	cale Hydro				None									
Electricity	Generated				0.00									
Apportion	ed				0.00							kWh/Yea	ar	
Connecte	d to dwelling's	electricity	meter		Yes									
Electricity	Generation				Annual									
Jan	Feb	М	ar	Apr	Мау	Jun		Jul	Aug	g S	ер	Oct	Nov	Dec
35.0 Special	Features													
Energy Saved	Fuel Saved	Energy Used	Fuel Used	l Descri	ption	Monthl Change		Techr	ecial lologies ype		Mar A	pr May Ju	un Jul Aug S	ep Oct Nov Dec
0.00		0.00						CO2	saving	0.00 0.00	0.000	.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

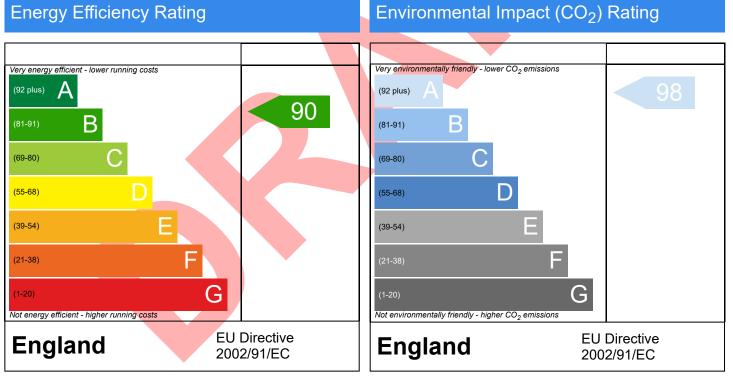


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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.

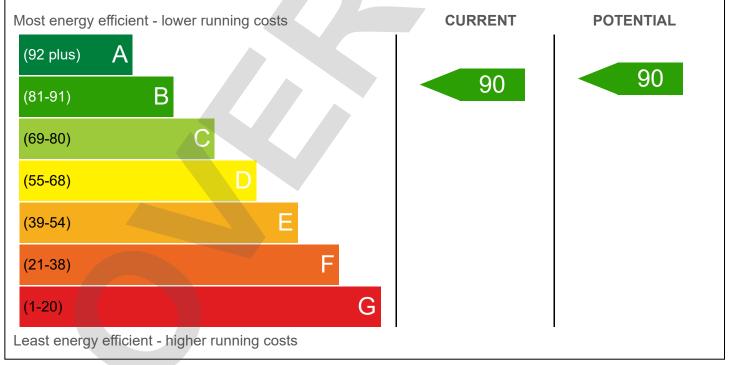


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley
Report Date	05/05/2023
Property Type	Flat, Detached
Floor Area [m ²]	71

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.





Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Very Good					
Feature	Description			Energy Performance				
Walls	Average thermal transmit	ttance 0.15 W/m²K		Very Good				
Roof	Average thermal transmit	Average thermal transmittance 0.11 W/m²K						
Windows	High performance glazin	Good						
Main heating	Air source heat pump, ra	Air source heat pump, radiators, electric						
Main heating controls	Programmer, room therm	nostat 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 CO₂ 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 CC) emissions	s 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	Potential Rating	Cumulative	Cumulative
	Yearly	after	savings	Potential
	Saving	measure installed	(per year)	Rating

Estimated energy use and potential savings



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		

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	ddress 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	λ Δ			
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 ² K]	Dwelling average U-Value [W/m ² K]	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,	1.6	1.3	Opening (1.3)	OK	
and roof windows					
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 ² K]		
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 ² K]	
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 - I	Main Dwelling: Thermal bridging ca	Iculated from linear thermal transm	ittances for each	i junction	
Main element Junction detail Source Psi value Draw [W/mK] reference					
External wall	E5: Ground floor (normal)	Government-approved scheme	0 (!)		
External wall	E6: Intermediate floor within a dwelling	Government-approved scheme	0 (!)		

External wall E18: Party wall between dwellings Government-approved scheme 0 (1) 3 Air permeability test or thin typically expocted values are flagged with a subsequent (1) Maker and the subsequent (1) OK Air permeability test certificate reference 1 OK OK 4 space heating 3 m ² /m ² , Design value (1) OK 4 space heating Start permeability at SOPa 3 m ² /m ² , Design value (1) OK 4 space heating Start permeability at SOPa 3 m ² /m ² , Design value (1) OK 4 space heating Start permeability at SOPa 3 m ² /m ² , Design value (1) OK 4 space heating Start permeability at SOPa 3 m ² /m ² , Design value (1) OK 5 Not metature 35°C Start permeability at SOPa Start permeability at SOPa Start permeability at SOPa 6 Controls N/A Errole N/ Model Start permeability at SOPa	Main element	Junction detail		Source	Psi value [W/mK]	Drawing / reference
Maximur permitted air permeability at 50Pa 8 m²/hm²	External wall	E18: Party wall betwee	n dwellings	Government-approved scheme	0 (!)	
Dwelling air permeability at 50Pa 3 m ³ /hm ³ , Design value (t) OK Air permeability test certificate reference 1 OK Main heating system 1: Heat pump with radiators or underfloor heating - Electricity Electricity Efficiency 362°C System type Reat Pump Radiators Electricity Flow temperature 36°C System type Main facturer Daikin Europe NV Model Commissioning ERLOOSCAV3 + EHVH08SU26CB6W Commissioning Secondary heating system: NA Electricity Electricity Fuel N/A Commissioning Commissioning 5 Hot water Cylinder/store - type: N/A Capacity N/A Primary Dipework insulated N/A Manufacturer Model Commissioning Commissioning Commissioning 6 Controls N/A Manufacturer Electricity Madel Edecoder Commissioning Commissioning 6 Controls Main Lecturer Manufacturer Ecodesign class Manufacturer Model Manufacturer Manufacturer Model Commissioning Cottols Cottols Manufacturer Model Cottols Cottols Manufactu	3 Air permeability (better than typically expected		y expected	values are flagged with a subsec	quent (!))	
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Manufacturer/Model Sentinel Kinetic Plus B		ficiencv	92%			ОК
				netic Plus B		
Commissioning			Jonanoi I di			

9 Local generation										
Technology type: Photovoltaic system	(1)									
eak power 0.66 kWp										
Orientation	South									
Pitch	Horizontal									
Overshading	None or very little	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										



Property Reference	Gre	eggs Bakery	Issue							sued on Date 05/			23	
Assessment Reference	Gre									s Bakery				
Property			Is Bakery D12 - Townhouse, D12, Twickenham, Thames Valley											
SAP Rating			90 B		DER		2.32			TER		9.50		
Environmental			_		% DER	< TED	2.32	2		TER				
CO ₂ Emissions (t/year)			98 A		DFEE	< TER	33.9	7		TFEE		75.58		
CO2 Emissions (Lyear) Compliance Check						E < TFEE		97		IFEE		38.64		
% DPER < TPER			See BREL		DPER			20		TPER		12.10		
% DPER < IPER			47.83		DPER		25.8	59		IFER		49.62		
Assessor Details	Mr. Keit	h Ketchley								Assess	or ID	Q303	-0001	
Client														
	UT DATA F	OR: New Build	(As Designed)											
Drientation			Unknown											
Property Tenture			ND											
ransaction Type			6											
errain Type			Suburban											
.0 Property Type			House, Mid-Terra	ace										
Which Floor			0											
.0 Number of Storeys			2											
.0 Date Built			2023											
.0 Sheltered Sides			0											
.0 Sunlight/Shade			Average or unkn	own										
.0 Thermal Mass Param	eter		Precise calculati	Precise calculation										
Thermal Mass			N/A	N/A							kJ/m²K			
.0 Electricity Tariff			Standard											
Smart electricity meter	fitted		Yes											
Smart gas meter fitted			Yes											
.0 Measurements			L											
			Base Ground 1st S 2nd S 3rd S 4th S 5th S 6th S 7th S	torey: torey: torey: torey: torey: torey:		Loss Pe 0.00 m 10.90 n 11.20 n 12.70 n 0.00 m 0.00 m 0.00 m 0.00 m	 1 1 1 1 1	r Int	ernal F 0.00 57.0 23.1 31.0 0.00 0.00 0.00 0.00 0.00	0 m ² 5 m ² 0 m ²) m ²) m ²) m ²	Ανε	2.5 2.5 2.5 0.0 0.0 0.0 0.0	orey H 0 m 0 m 0 m 0 m 0 m 0 m 0 m 0 m 0 m	∍igh
.0 Living Area			23.03							m²				
.0 External Walls														
Description	Туре	Construction			U-Value (W/m²K)	Kappa (kJ/m²K)		Nett Area) (m²)	Shelter Res	Shelte	er Op	enings A	rea Calci Type	
External Wall 1	Cavity Wall	Cavity wall : plaste filled cavity, any or	erboard on dabs, AAC blo utside structure	ck,	0.15	60.00	50.85	34.77	0.00	None	1	6.08 E	nter Gros	s Ar
.1 Party Walls														
Description	Туре	Constr	ruction					U-Value (W/m²K)			Shelte Res		Shelte	r
Party Wall 1	Filled 0 Edge S		board on dabs moun \AC blocks, cavity	ited or	n cemen	t render o	on both		45.00				None	
0.0 External Roofs	_				_									
Description	Туре	Construction	on			-Value K //m²K)(k.		Gross Area(m²)	Nett Area	Shelter Code	Shelter (Factor	Calculat Type		nin
External Roof 1	External S Roof	Slope Plasterboar	d, insulated slope		-		9.00	76.20	(m²) 5.00	None	0.00 E	Enter Gr Area		5.00
0.2 Internal Ceilings														



11.0 Heat Loss Floors Description	Туре	Storey Index	Construction		U-Val (W/m²		Shelter Code	She Fac		pa Area(m [:] ²K)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete	floor, carpeted	0.12		None	0.0		
12.0 Opening Types Description	Data Source	Туре	Glazing		Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1 Opening Type 2 Opening Type 3	Manufacturer Manufacturer Manufacturer	Half Glazed Do Window Roof Light		v-E Soft 0.05 v-E Soft 0.05 E Soft 0.05	oup	Air Filled Air Filled Air Filled	0.63	Wood Wood Wood	0.80 0.80 0.70	1.30 1.30 1.30
13.0 Openings										
Name Opening Opening Door Opening	Opening Ty Opening Typ Opening Typ Opening Typ Opening Typ	be 2 be 2 be 1	Location External Wall 1 External Wall 1 External Wall 1 External Roof 1		Orienta Nori Eas Eas Nori	th st st	Area 8.1 5.4 2.5 5.0	5 0 3		tch 0 0 11
14.0 Conservatory			None							
15.0 Draught Proofing			100				%			
16.0 Draught Lobby			No							
17.0 Thormal Bridaina			Colouloto Bridger							
17.0 Thermal Bridging 17.1 List of Bridges			Calculate Bridges	j						
Bridge Type E5 Ground floor (normal) E6 Intermediate floor withi E18 Party wall between dy		Gov Gov	Approved Schem Approved Schem Approved Schem Approved Schem	e 11.20	Psi 0.00 0.00 0.00	Adjusted 0.00 0.00 0.00	Reference	:		Imported Yes Yes Yes
Y-value			0.00				W/m²K			
18.0 Pressure Testing			Yes							
Designed AP50			3.00				m³/(h.m	^{ı²}) @ 50 Pa		
Property Tested?			Yes							
Test Method			Blower Door							
As Built AP 50			0.10				m³/(h.m	^ı ²) @ 50 Pa		
19.0 Mechanical Ventilation										
Mechanical Ventilation							_			
Mechanical Ventilation	on System Prese	ent	Yes							
Approved Installation	ו		No							
Mechanical Ventilation	on data Type		Database							
Туре				nical ventilation with h	eat recove	ry				
MV Reference Num	ber		500167							
Configuration			2							
MVHR Duct Insulate	d		Insulated Ducts							
Manufacturer SFP			0.55							
Duct Type			Rigid							
MVHR Efficiency			92.00							
Wet Rooms			2							
SFP from Installer C		ertificate	No							
MVHR System Loca				velope (installed exclu	isively)					
Duct Installation Spe			Level 1							
20.0 Fans, Open Fireplaces,	Flues		No							
21.0 Fixed Cooling System			UVI							
22.0 Lighting No Fixed Lighting			No							
Ho I Mod Lighting			Name Lighting 1	Efficacy 85.00		wer 5	 Capa 42			ount 10
24.0 Main Heating 1			Database				7			
Description			Electric Heat Pun	ns			=			



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 U	se Efficiency Percentage Of Heat Heat Elec Heat Power Ratio	ctrical Fuel Factor Efficiency type
Heat source 1NoneHeat source 2NoneHeat source 3NoneHeat source 4NoneHeat source 5None	i dilo	
28.0 Water Heating		
Water Heating	Main Heating 1	
	901	
SAP Code		
SAP Code Flue Gas Heat Recovery System	No	
Flue Gas Heat Recovery System	No	

Solar Panel

Water use <= 125 litres/person/day Summer Immersion

	901
	No
/stem 1	No
/stem 2	No
	No
	No
	No
	No
	From mains
	0
	No
	No

28.1 Showers

Cold Water Source Bath Count

Supplementary Immersion Immersion Only Heating Hot Water



Descripti	on		s	hower Type)				w Rate /min]		ver C	onnected	Connected	То
Shower			N	ented hot wa	ater syst	em			7.00	[kW]		No	Storage Sys	tem
28.3 Waste V	Vater Heat Re	covery Sy	/stem											
29.0 Hot Wat	er Cylinder				Interna	I Store								
Cylinder S	Stat				No									
Cylinder I	n Heated Spa	ce			No									
Independ	ent Time Cont	rol			No									
Insulation	Туре				Measu	red Loss								
Cylinder \	/olume				245.00							L		
Loss					1.92							kWh/day	/	
In Airing (Cupboard				No									
31.0 Therma	I Store				None									
32.0 Photovo	oltaic Unit				One D	welling								
Export Ca	apable Meter?				Yes									
Connecte	d To Dwelling				Yes									
Diverter					No									
Battery C	apacity [kWh]				0.00									
PV	Cells kWp	0	rientation	Elevation	0\	vershading	FGHRS	;	MCS Ce	ertificate	Overs Facto	or	MCS Certificate Reference	Panel Manufacturer
0.66	6	S	outh	Horizontal	No	one Or Little	No		No		1.00		Reference	
34.0 Small-s	cale Hydro				None									
Electricity	Generated				0.00									
Apportion	ed				0.00							kWh/Yea	ar	
Connecte	d to dwelling's	electricity	meter		Yes									
Electricity	Generation				Annual									
Jan	Feb	М	ar	Apr	Мау	Jun		Jul	Aug	g S	ер	Oct	Nov	Dec
35.0 Special	Features													
Energy Saved	Fuel Saved	Energy Used	Fuel Used	l Descri	iption	Monthl Change		Techr	ecial lologies ype		Mar A	pr May J	un Jul Aug S	ep Oct Nov Dec
0.00		0.00						CO2	saving ature	0.00 0.00	0.000	.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

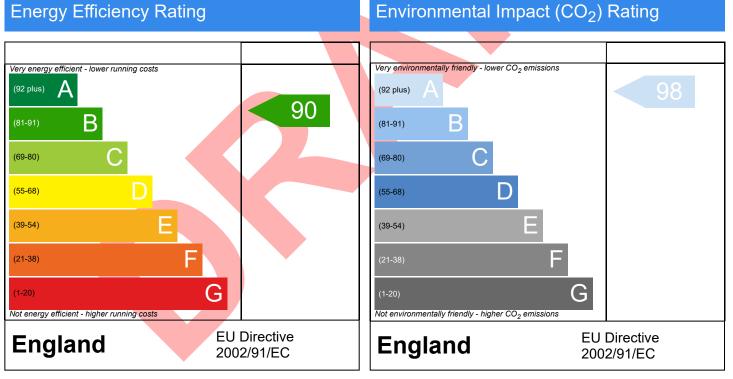


Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley

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

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.



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. 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

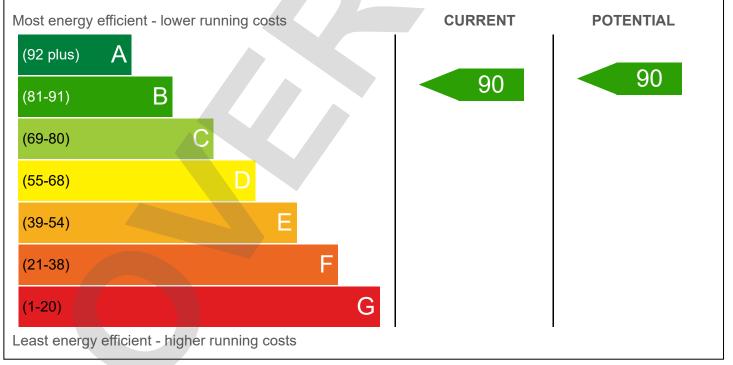


Dwelling Address	Gregs Bakery D12 - Townhouse, D12, Twickenham, Thames Valley		
Report Date	05/05/2023		
Property Type	House, Mid-Terrace		
Floor Area [m ²]	80		

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.





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 transmi	ttance 0.15 W/m²K		Very Good
Roof	Average thermal transmi	ttance 0.11 W/m²K		Very Good
Floor	Average thermal transmi	Very Good		
Windows	High performance glazing	Good		
Main heating	Air source heat pump, ra	Very Good		
Main heating controls	Programmer, room therm	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 CO₂ 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	СО	emissions	for	this	dwellings	is:	
-----	-----------	----	-----------	-----	------	-----------	-----	--

0.2 per year



With the recommended measures the potential CO emissions could be:

per year

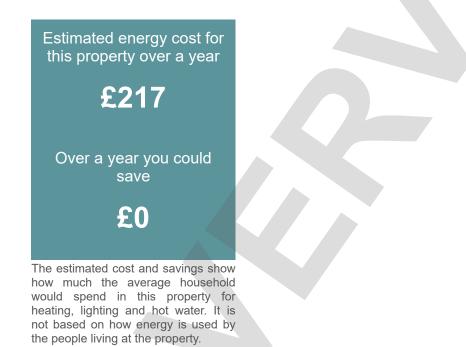
0

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

Estimated energy use and potential savings



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

 Ref:
 1823-50-RPT-09

 Date:
 9th May 2023

 Revision:
 07

BRUKL Output Document We HM Government

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 1 - BE LEAN

Shell and Core

As designed

Date: Fri May 05 13:01:06 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

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

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 324.95

The CO₂ 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?annum	n rate (BER), kgCO ₂ /m.annum 2.9		
Target primary energy rate (TPER), kWhee/mannum	36.63		
Building primary energy rate (BPER), kWhee/m2annum	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	Ua-Limit	Ua-Calc	Ui-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
Uatimit = Limiting area-weighted average U-values [W/(m	²K)]		Ui-Calc = Cá	alculated maximum individual element U-values [W/(m ⁺ K)]

Ja-Limit = Limiting area-weighted average U-values [W/(m²K)] Uacute = 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		
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
Α	Local supply or extract ventilation units
В	Zonal supply system where the fan is remote from the zone
С	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
Н	Fan coil units
1	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name		SFP [W/(I/s)]						HR efficiency			
ID of system type	Α	В	С	D	E	F	G	н	1		inciency
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	-	-	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 [Im/W]	Efficacy [Im/W]	Power density [W/m ²]	
Standard value	95	80	0.3	
Industrial Unit 01 FF	130	-	-	
Industrial Unit 01 GF	130	-	2	

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	% Ar
Floor area (m ²)	325	325	13
External area [m ²]	967.3	967.3	
Weather	LON	LON	87
Infiltration [m³/hm²@ 50Pa]	3	5	0/
Average conductance [W/K]	221.48	302.71	
Average U-value [W/m ² K]	0.23	0.31	_
Alpha value* [%]	9.95	10	

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	38.73	86.11
Primary energy [kWhpe/m2]	30.88	36.63
Total emissions [kg/m ²]	2.9	3.49

Building Use

ea	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	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

ł	IVAC Sys	stems Pei	rformanc	е						
		and the second se	Cool dem MJ/m2		Cool con kWh/m2		Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[S1	[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

Cool dem [MJ/m2] Heat SSEFF Cool SSEER Heat gen SSEFF Cool gen SSEER ST HS HFT CFT

- Heat dem [MJ/m2] = Heating energy demand = Cooling energy demand Heat con [kWh/m2] = Heating energy consumption Cool con [kWh/m2] = Cooling energy consumption Aux con [kWh/m2] = Auxiliary energy consumption = Heating system seasonal efficiency (for notional building, value depends on activity glazing class) = Cooling system seasonal energy efficiency ratio = Heating generator seasonal efficiency
 - = Cooling generator seasonal energy efficiency ratio
 - = System type
 - = Heat source
 - = Heating fuel type
 - = Cooling fuel type

BRUKL Output Document

😻 HM Government

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 2 - BE LEAN

Date: Thu Apr 27 15:17:44 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

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

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 324.95

The CO₂ 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), kWhee/m?annum	36.63		
Building primary energy rate (BPER), kWhee/m2annum	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	Ua-Limit	Ua-Calc	Ui-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	(7)	171	No vehicle access doors in building
High usage entrance doors	3	14	-	No high usage entrance doors in building
Us.Limt = Limiting area-weighted average U-values [W/(m	²K)]		Ui-Calc = Ca	alculated maximum individual element U-values [W/(m ² K)]

U & Limit = Limiting area-weighted average U-values [W/(m^zK)] U & calc = Calculated area-weighted average U-values [W/(m^zK)]

* 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

Shell and Core

As designed

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 moni	toring & targeting w	ith alarms for out-of	-range values for th	is HVAC system	m NO
		, except absorption and ga		IS HVAC SYSTEM	

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
Α	Local supply or extract ventilation units
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E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
Н	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name		SFP [W/(I/s)]							UD -	HR efficiency	
ID of system type	Α	В	С	D	E	F	G	H	1		mciency
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	-	-	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 [Im/W]	Efficacy [Im/W]	Power density [W/m ²]	
Standard valu	Je 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?				
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	% Are
Floor area [m ²]	325	325	13
External area [m ²]	967.3	967.3	
Weather	LON	LON	87
Infiltration [m³/hm²@ 50Pa]	3	5	0/
Average conductance [W/K]	221.48	302.71	
Average U-value [W/m ² K]	0.23	0.31	
Alpha value* [%]	9.95	10	5

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

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 & CO₂ 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

Building Use

rea	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	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

ŀ	HVAC Systems Performance									
Sys	stem Type	Heat dem MJ/m2	Cool dem MJ/m2	and the second se		Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST	[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		1900

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HFT

CFT

Heat dem [MJ/m2] = Heating energy demand Cool dem [MJ/m2] = Cooling energy demand Heat con [kWh/m2] = Heating energy consumption Heat SSEFF Cool SSEER Heat gen SSEFF Cool gen SSEER ST HS

- Cool con [kWh/m2] = Cooling energy consumption Aux con [kWh/m2] = Auxiliary energy consumption = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
 - = Cooling system seasonal energy efficiency ratio = Heating generator seasonal efficiency
 - - = Cooling generator seasonal energy efficiency ratio
 - = System type
 - = Heat source
 - = Heating fuel type
 - = Cooling fuel type

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 3 - BE LEAN

Date: Fri May 05 12:56:42 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

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

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 151.59

The CO₂ 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), kWhe/m?annum	34.58	
Building primary energy rate (BPER), kWhee/m?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	Ua-Limit	Ua-Calc	Ui-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
Ualumit = Limiting area-weighted average U-values [W/(mi	²K)]	^	U -Cale = Ca	alculated maximum individual element U-values [W/(m²K)]

UaLimit = Limiting area-weighted average U-values [W/(m^xK)] Uacate = 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

Shell and Core

As designed

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			
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 moni	itoring & targeting w	ith alarms for out-of	-range values for thi	is HVAC system	n NO
* Standard shown is	for all types >12 kW output	, except absorption and gas	s 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
Α	Local supply or extract ventilation units
В	Zonal supply system where the fan is remote from the zone
С	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
Н	Fan coil units
1	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name				SF	P [W/	(l/s)]					efficiency
ID of system type	Α	В	С	D	Е	F	G	Н		nne	melency
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	Displa	y light source
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
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	% Are
151.6	151.6	
402.7	402.7	-
LON	LON	- 100
3	5	100
114.36	119.7	
0.28	0.3	_
9.95	10	2
	151.6 402.7 LON 3 114.36 0.28	151.6 151.6 402.7 402.7 LON LON 3 5 114.36 119.7 0.28 0.3

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand (MJ/m ²)	35.6	60.62
Primary energy [kWh _{PE} /m ²]	30.73	34.58
Total emissions [kg/m ²]	2.89	3.29

Building Use

% Area Building Type

Retail/Financial and Professional Services
Restaurants and Cafes/Drinking Establishments/Takeaways
Offices and Workshop Businesses
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

ŀ	HVAC Systems Performance											
System Type			Cool dem MJ/m2		Cool con kWh/m2		Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER		
[S1] Central he	eating using	g water: rad	liators, [HS]	ASHP, [HP	T] Electric	ity, [CFT] E	lectricity				
	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)

- = Cooling system seasonal energy efficiency ratio
- Cool SSEER Heat gen SSEFF = Heating generator seasonal efficiency Cool gen SSEER ST
 - Freating generator seasonal energy efficiency ratio
 System type
 Heat source

HS

HFT CFT

- = Heating fuel type = Cooling fuel type

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 4 - BE LEAN

Shell and Core

As designed

Date: Thu Apr 27 15:03:47 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

Certification tool

Calculation englne: 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

🛞 HM Government

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 196.98

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.55			
ilding CO ₂ emission rate (BER), kgCO ₂ /m ² annum 2.95				
Target primary energy rate (TPER), kWher/m.annum	37.18			
Building primary energy rate (BPER), kWh _{ef} /m²annum	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	Ua-Limit	Ua-Calc	Ul-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
II. umi - Limiting area-weighted average II.values [W//m]	²K)1		Hacata = Ca	culated maximum individual element LI-values (W/(m²K))

Limit = Limiting area-weighted average U-values [W/(m²K)] Uacate = Calculated area-weighted average U-values [W/(m²K)] Calculated maximum individual element 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/(I/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
Α	Local supply or extract ventilation units
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
Е	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
н	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name		SFP [W/(I/s)]							UD officiency		
ID of system type	Α	В	С	D	E	F	G	Н	I	HR efficiency	
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	-	-	-	-	-	* 3	N/A

Shell and core configuration

Zone	Assumed shell?
Industrial Unit 04 GF	NO

General lighting and display lighting	General luminaire	Displa	y light source
Zone name	Efficacy [lm/W]	Efficacy [Im/W]	Power density [W/m ²]
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	% Are
Floor area (m ²)	197	197	
External area [m ²]	647.8	647.8	
Weather	LON	LON	- 100
Infiltration [m³/hm²@ 50Pa]	3	5	100
Average conductance [W/K]	158.75	187.64	
Average U-value [W/m ² K]	0.25	0.29	
Alpha value* [%]	9.95	10	

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Energy Consumption by End Use [kWh/m²]

Actual	
4.31	8.36
0	0
7.23	4.68
5.16	7.61
4.24	4.03
Equipment* 29.87	
20.94	24.68
	4.31 0 7.23 5.16 4.24 29.87

* 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	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	43.13	83.63
Primary energy [kWh _{PE} /m ²]	31.35	37.18
Total emissions [kg/m ²]	2.95	3.55

Building Use

% Area Building Type

Retail/Financial and Professional Services
Restaurants and Cafes/Drinking Establishments/Takeaways
Offices and Workshop Businesses
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

ŀ	IVAC Sys	tems Pe	formanc	e						
Sys	stem Type	Heat dem MJ/m2	Cool dem MJ/m2		Cool con kWh/m2		Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central he	eating using	y water: rad	lators, [HS]	ASHP, [HF	T] Electrici	ty, [CFT] El	ectricity		
	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] Cool dem [MJ/m2] Heat con [kWh/m2] Cool con [kWh/m2] Aux con [kWh/m2] Heat SSEFF	 Heating energy demand Cooling energy demand Heating energy consumption Cooling energy consumption Auxiliary energy consumption Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER Heat gen SSEFF Cool gen SSEER ST HS HFT CFT	 Cooling system seasonal energy efficiency ratio Heating generator seasonal efficiency Cooling generator seasonal energy efficiency ratio System type Heat source Heating fuel type Cooling fuel type

- System type
 Heat source
 Heating fuel type
 Cooling fuel type

Appendix E – Be GREEN BRUKL report for industrial units

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 1 - BE GREEN

Date: Fri May 05 12:16:25 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

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

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 324.95

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.54
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	0.81
Target primary energy rate (TPER), kWh₀₂/m²annum	37.46
Building primary energy rate (BPER), kWhee/m2annum	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	Ua-Limit	Ua-Calc	Ui-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
Ua-Limit = Limiting area-weighted average U-values [W/(mi	²K)]		Ui-Cale = Ca	alculated maximum individual element U-values (W/(m²K))

U a Limit = Limiting area-weighted average U-values [W/(m²K)] U a 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

Shell and Core

As designed

🛞 HM Government

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 moni	itoring & targeting w	ith alarms for out-of	-range values for th	is HVAC syster	n	NO
		ith alarms for out-of , except absorption and ga		is HVAC syster	<u>n </u>	NO

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
Α	Local supply or extract ventilation units
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
Е	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
Н	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name		SFP [W/(I/s)]							HR officiency		
ID of system type	A	В	С	D	E	F	G	н	1	HR efficiency	
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	Displa	y light source
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
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	% Ar
Floor area [m ²]	325	325	13
External area [m2]	967.3	967.3	
Weather	LON	LON	- 87
Infiltration [m ³ /hm ² @ 50Pa]	3	5	- 0/
Average conductance [W/K]	221.48	302.71	5 2
Average U-value [W/m ² K]	0.23	0.31	-
Alpha value* [%]	9.95	10	

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	102.94	127.61
Primary energy [kWh _{PE} /m ²]	7.32	37.46
Total emissions [kg/m ²]	0.81	3.54

Building Use

% Area	Building Type
13	Retall/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

ŀ	HVAC Systems Performance									
System Type		Heat dem MJ/m2	Cool dem MJ/m2	the second second second second second second second second second second second second second second second se		Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
(S1	[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		

v	ONT	10	tor	ano
n	ev	10	ter	ms

CFT

Heat dem [MJ/m2] = Heating energy demand Cool dem [MJ/m2] Heat SSEFF Cool SSEER Heat gen SSEFF Cool gen SSEER ST HS HET

- = Cooling energy demand Heat con [kWh/m2] = Heating energy consumption Cool con [kWh/m2] = Cooling energy consumption Aux con [kWh/m2] = Auxiliary energy consumption = Heating system seasonal efficiency (for notional building, value depends on activity glazing class) = Cooling system seasonal energy efficiency ratio = Heating generator seasonal efficiency
 - = Cooling generator seasonal energy efficiency ratio
 - = System type
 - = Heat source
 - = Heating fuel type
 - = Cooling fuel type

BRUKL Output Document

🛞 HM Government

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 2 - BE GREEN

Date: Fri May 05 16:27:13 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

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

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 169.48

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.7		
Building CO ₂ emission rate (BER), kgCO ₂ /m?annum	0.19		
Target primary energy rate (TPER), kWhee/m?annum	39.46		
Building primary energy rate (BPER), kWhee/m2annum	-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	Ua-Limit	Ua-Cate	UI-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	2.7.5	-	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	-	120	No personnel doors in building
Vehicle access & similar large doors	1.3	-	- 1	No vehicle access doors in building
High usage entrance doors	3	_	-	No high usage entrance doors in building
Uatimit = Limiting area-weighted average U-values (W/(m	²K)]		U Cale = Ca	alculated maximum individual element U-values [W/(m ^r K)]

 $U_{a\ Limit} = Limiting \ area-weighted \ average \ U-values \ [W/(m^2K)] \\ U_{a\ Calc} = Calculated \ area-weighted \ average \ U-values \ [W/(m^2K)]$

* 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/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

Shell and Core

As designed

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						
		, except absorption and gas	*			

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
Α	Local supply or extract ventilation units
В	Zonal supply system where the fan is remote from the zone
С	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
н	Fan coil units
Ι	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name ID of system type		SFP [W/(I/s)]						HR efficiency			
		В	С	D	E	F	G	н	1		anciency
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	-	-	-	-	-	-	- 1	-	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/m ²]	
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

	l % Are
or area [m²]	
ernal area [m²]	
ather	100
Itration [m ³ /hm ² @ 50Pa]	100
erage conductance [W/K]	
erage U-value [W/m²K]	
ha value* [%]	
erage U-value [W/m²K]	

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	142.13	124.38
Primary energy [kWh _{PE} /m ²]	-1.13	39.46
Total emissions [kg/m ²]	0.19	3.7

Building Use

% Area Building Type

Retail/Financial and Professional Services
Restaurants and Cafes/Drinking Establishments/Takeaways
Offices and Workshop Businesses
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

ŀ	IVAC Sys	stems Pe	rformanc	e						
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 ge SEFF						Heat gen SEFF	Cool gen SEER			
[[S]	[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] Cool dem [MJ/m2]	 Heating energy demand Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2] Aux con [kWh/m2]	= Cooling energy consumption = Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER Heat gen SSEFF	 Cooling system seasonal energy efficiency ratio Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST HS	= System type = Heat source
HFT	= Heat source = Heating fuel type
CFT	= Cooling fuel type

- System type
 Heat source
 Heating fuel type
 Cooling fuel type

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 3 - BE GREEN

Date: Fri May 05 16:36:06 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

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

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 169.48

The CO₂ 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), kWhee/m2annum	38.64	
Building primary energy rate (BPER), kWher/m2annum	-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	Ua-Limit	Ua-Calc	UI-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
It sum - Limiting area weighted average IL-values (W//mi	² K)]		Hucher= Ca	alculated maximum individual element U-values (W/(m ² K))

Uscate = Calculated area-weighted average U-values [W/(m*K)]

* 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

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Shell and Core

As designed

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/(I/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 f	or all types >12 kW output	except absorption and gas	s 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
Α	Local supply or extract ventilation units
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
Е	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
н	Fan coil units
1	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name		SFP [W/(I/s)]						LID officiency			
ID of system type	Α	B	С	D	E	F	G	н	1	HR efficiency	
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	e Display light source		
Zone name	Efficacy [Im/W]	Efficacy [lm/W]	Power density [W/m ²]	
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	% Are
169.5	169.5	11
454.9	454.9	
LON	LON	89
3	5	- 03
135.23	144.45	
0.3	0.32	S
9.95	10	
	169.5 454.9 LON 3 135.23 0.3	169.5169.5454.9454.9LONLON35135.23144.450.30.32

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	140.45	119.14
Primary energy [kWhpe/m2]	-11.38	38.64
Total emissions [kg/m ²]	-0.79	3.63

Building Use

% Area Building Type

Retail/Financial and Professional Services
Restaurants and Cafes/Drinking Establishments/Takeaways
Offices and Workshop Businesses
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

ŀ	HVAC Sys	stems Pe	rformanc	e						
Sy	stem Type	the result of the second	Cool dem MJ/m2			Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[S]	[] Split or m	ulti-split sy	stem, [HS]	ASHP, [HF]	[] Electricit	y, [CFT] Ele	ectricity			
	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] Cool dem [MJ/m2] Heat con [kWh/m2] Cool con [kWh/m2] Aux con [kWh/m2] Heat SSEFF Cool SSEER Heat gen SSEFF Cool gen SSEER ST HS HFT CFT	

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

Project name

Greggs Bakery Commerical Unit 4 - BE GREEN

Date: Fri May 05 16:39:19 2023

Administrative information

Building Details

Address: London Square, London, W1F 8GY

Certifier details

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

🛞 HM Government

Name: Desco Telephone number: 0191 522 2070 Address: Azure House, 2 Azure Ct, Sunderland, SR3 3BE

Foundation area [m²]: 222.44

The CO₂ 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), kWhee/m?annum	39.97	
Building primary energy rate (BPER), kWh₂r/m²annum	-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	Ua-Limit	Ua-Calc	Ui-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
UaLimit = Limiting area-weighted average U-values [W/(m	²K)]		U - calc = Ca	alculated maximum individual element U-values (W/(m ⁱ K))

U a Limit = Limiting area-weighted average U-values [W/(m²K)] U a-calc = Calculated area-weighted average U-values [W/(m²K)]

12,340.0

* 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

Shell and Core

As designed

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

F	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency	
This system 4	4	4.5	0	-	0.9	
Standard value 2	2.5*	5	N/A	N/A	N/A	
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system NO						

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
Α	Local supply or extract ventilation units
В	Zonal supply system where the fan is remote from the zone
С	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
Н	Fan coil units
1	Kitchen extract with the fan remote from the zone and a grease filter
NB: L	imiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name		SFP [W/(I/s)]						HD officionau			
ID of system type	Α	В	С	D	E	F	G	Н	1	- HR efficiency	
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 [Im/W]	Efficacy [lm/W]	Power density [W/m ²]	
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	% Ar
Floor area (m ²)	222.4	222.4	11
External area [m ²]	730	730	1110.0408.000
Weather	LON	LON	- 89
Infiltration [m ³ /hm ² @ 50Pa]	3	5	- 09
Average conductance [W/K]	175.98	227.86	_
Average U-value [W/m ² K]	0.24	0.31	
Alpha value* [%]	9.95	10	_

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

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	Notiona
Photovoltaic systems	24.48	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	24.48	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	119.05	139.95
Primary energy [kWhee/m2]	-1.91	39.97
Total emissions [kg/m ²]	0.04	3.78

Building Use

rea	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	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

ŀ	HVAC Systems Performance									
Sy	stem Type	Heat dem MJ/m2	Cool dem MJ/m2	the spin of the second s		Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[\$1	[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

 Ref:
 1823-50-RPT-09

 Date:
 9th May 2023

 Revision:
 07

Part L 2021 Performance Non-residential

Residential

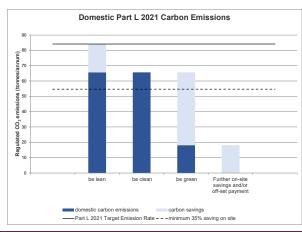
Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)		
	Regulated	Unregulated	
Baseline: Part L 2021 of the Building Regulations Compliant 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	A recommended price of £95 pr	er 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	-

EUI & space heating demand (predicted energy use)

Residential

Building type	EUI (kWh/m ² /year) (excluding renewable energy)	Space heating demand (kWh/m ² /year)	4 of the guidance	Space heating demand from Table 4 of the guidance(kWh/m²/year) (excluding renewable energy)	(e.g. 'be seen' methodology or	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/m ² /year)	4 of the guidance	Space heating demand from Table 4 of the guidance(kWh/m ² /year) (excluding renewable energy)	(e.g. 'be seen' methodology or	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	

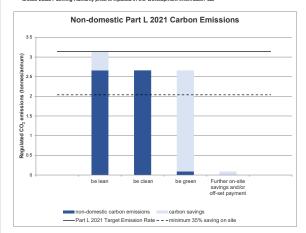
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO ₂ per annum)		
	Regulated	Unregulated	
Baseline: Part L 2021 of the Building Regulations Compliant 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)	(%)			
0.5	15%			
0.0	0%			
2.6	82%			
3.0	97%			
0.1	-			
(Tonnes CO ₂)				
3	-			
258				
	(Tonnes CO ₂ per annum) 0.5 0.0 2.6 3.0 0.1 (Tonne 3			

*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



	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

