



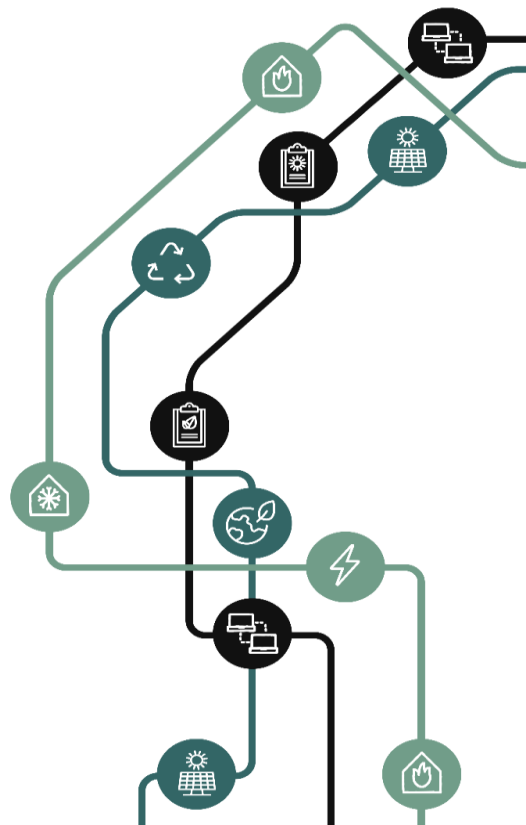
G.H. SHELDON WHOLESALE BAKERS LTD., OPENSHAW

ENERGY STATEMENT

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G.H. SHELDON WHOLESALE BAKERS LTD., OPENSHAW

ENERGY STATEMENT

DOCUMENT CONTROL

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G.H. SHELDON WHOLESALE BAKERS LTD., OPENSHAW

ENERGY STATEMENT

CONTENTS

1.0 Executive Summary

2.0 Introduction

3.0 Anticipated Building Energy Demand

4.0 Proposed Services Strategy Analysis

Appendix A As Designed Thermal Model and Anticipated EPC Rating

Appendix B PV Assessment

1.0 Executive Summary

On developing the MEP services solution for G.H. Sheldon Wholesale Bakers, we have reviewed likely feasibility for numerous services solutions, including Low and Zero Carbon technologies, the following of which we are proposing to utilise as part of our design proposals;

1. Extensive rooftop solar panel array for renewable energy generation
2. EV charging points and infrastructure to allow increased future points
3. Low fabric thermal properties, to far exceed current standards
4. Highly efficient MEP installations and associated controls, including heat pumps and heat recovery technology.

The preliminary Thermal Model suggests that the current proposals far exceed the minimum requirements of Approved Document, Part L, in terms of predicted energy use and associated carbon emissions, and an EPC A rating would be achieved.

2.0 Introduction

This application is in relation to the development of a new Bakery, for Sheldon Wholesale Bakers, in Openshaw, Manchester, bounded by Kelbrook Road and Clayton Lane.

Viridian Consulting Engineers has been appointed to design the Mechanical, Electrical and Public Health installations and produce an Energy Statement to accompany the Planning Submission for the development.

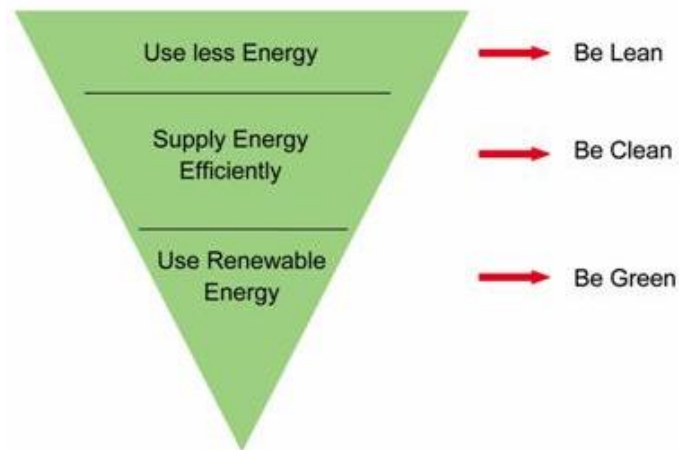
This report identifies the proposed energy efficiency measures to be incorporated in the building's design, including the incorporation of Low and Zero Carbon technologies, to reduce energy usage and associated carbon emissions.

Our approach has been to develop the building design, ensuring a low energy demand and high levels of energy efficiency, before considering the provision of on-site LZC technologies.

On review, we confirm that there is local access to the necessary utility infrastructure services, to service the site in terms of process load requirements, ensuring a comfortable environment and to facilitate feeding back electricity to the grid.

An Energy Hierarchy has been utilised to help guide decisions about which energy measures are appropriate in particular circumstances. When each stage of the Hierarchy is applied, it will help ensure that the sites energy needs are met in the most efficient way:

- i. Use less energy (Be lean)
- ii. Supply energy efficiently (Be clean)
- iii. Use renewable energy (Be green)



It is therefore important for energy efficiency, as well as renewable energy, to be considered in detail. This means that the building will use less energy and therefore need to use a smaller amount of renewable energy to supply the same proportion of the site's needs.

On review of the shortlisted renewable technologies, for further consideration, a detailed feasibility study will be undertaken to determine likely costs and benefits to the development.

Reference to C.I.B.S.E design information and other renewable toolkits have been made to help produce this report.

3.0 Anticipated Building Energy Demand

The estimated overall energy requirements for the development has been estimated with reference to existing Bakery utility bills, equipment technical data and C.I.B.S.E Energy Benchmarks. This will be developed during the detailed design process. We have produced an initial thermal model for the building, based upon the anticipated service strategy, details of which can be found within the Appendices of this report.

From existing utility bills and details of the proposed equipment within the Bakery, the main use of the utility supplies and associated carbon emissions, can be attributed to the baking process equipment and associated services. The quantity of annual gas and electricity usage of the bakery cannot currently be estimated with any level of accuracy, given that only one line is initially proposed, with the fuel source of the remaining 2No future lines unknown at this stage.

Based upon the worse case scenario of 3No fully electric lines in the future, we have estimated that the incoming electricity supply would incorporate a private 1mVA sub-station.

We have estimated the worse case gas load, based upon 3No gas ovens in the future, with a possibility that the existing gas network will possibly utilise green hydrogen in the future. A quotation has been obtained for this size of supply.

We have estimated the likely building potable water supply requirement for the building and estimate that a 63mm diameter supply will be required for domestic and process use. A separate 100mm diameter supply is proposed to feed the sprinkler system.

4.0 Proposed Services Strategy Analysis

Large areas of the building will remain unheated, particularly in the goods in and out areas. The main energy use for these areas is likely to be for lighting of the space. For lighting to these areas, we are proposing to utilise highly efficient LED high bay luminaires. PIR presence detection control is proposed within the storage areas, production areas and ancillary areas, in order to minimise energy use from lighting in the areas.

The Bakery production area is to be contained within an insulated enclosure. Ventilation will be required to positively pressurise the area, to avoid contaminants, provide environmental control for the process and filtered fresh air for occupancy.

We are proposing to provide environmental control to the ancillary office areas, to provide heating and cooling to minimise peak summertime temperatures. Fresh air is also to be provided for occupancy and to help control ongoing running costs and internal environmental conditions.

The following Low and Zero carbon technologies were considered for outline analysis, with the technologies considered worthy of further consideration reviewed in greater detail, later in this report.

1. Heat Pumps:
2. Photovoltaics
3. Battery Storage

These technologies have been analysed in two stages:

First Stage.

- Highlighting technologies appropriate to the site.
- Reasons for excluding other technologies.

Second Stage

- Energy generated from LZC energy source per year
- Payback
- Land use
- Local planning requirements
- Noise
- Feasibility of exporting electricity
- Life cycle cost/life cycle impact of the potential specification in terms of carbon emissions
- Any available grants

4.1 Outline Analysis

The following table shows the LZC technologies with an indication if they will be excluded or included in the Stage 2 assessment. The reason for excluding technologies is also provided.

LZC Technology	Include?	Reasons
	YES/NO	
Heat Pumps		
1. Ground Source	Yes	Highly efficient. Ground investigations required.
2. Air Source	Yes	Highly efficient. Slightly less efficient than Ground Source but lower capital cost.
Solar		
1. Photovoltaic	Yes	Low maintenance costs. Zero Carbon energy.
2. Solar Thermal	No	High capital cost, in comparison to PV and relatively low hot water demand.
Water		
1. Rainwater Recycling	Yes	Savings on domestic water costs. Attenuation of surface water a benefit although SuDs currently proposed to reduce this. Could possibly be utilised for WC flushing and irrigation, however, unlikely to be cost effective, given the SuDs requirement.
2. Greywater Recycling	No	Relatively small volume and benefit for toilet flushing. Treatment required. High capital cost and repayment time. High ongoing maintenance.
Wind		
1. Wind Turbines	No	Turbulent air from buildings and trees is not generally suitable for turbine location.

		Noise and ecological impact are major considerations. Visual impact for planning.
Biomass Heating		
1. Wood Chip/Biomass Boiler plant	No	High maintenance costs Products of combustion omitted close to housing. Fuel store required.
Combined Heat and Power (CHP)		
1. Gas Fired	No	CO2 omissions
2. Biomass fuel	No	Products of combustion omitted close to housing.
Battery Storage		
For use with PV installations	Yes	Energy savings and security of supply.

4.2 Technology Analysis

4.2.1 Heat Pumps:

Heat pumps use refrigerant gasses in an electrically powered compressor unit to take heat from its source and provide it to a heating or cooling system or other similar.

These can be air to air, air to water, or ground source heat pumps. Ground source heat pumps are more efficient as they use more stable temperatures.

i) Ground Source Heat Pumps

Ground Source Heat Pump (GSHP) systems utilize the low-grade heat absorbed by the ground from solar irradiation. At a depth of 5m a seasonal fluctuating temperature of between 8-12°C is recorded. At 20m the temperature becomes constant and at additional depths of 33m the temperature rises by circa 1°C.

The ground source heat can be extracted using coils of special plastic pipework and can be either laid in trenches or in bore holes. Areas required for trenches can be extensive. Boreholes could be utilized

but the number required to produce a useful base load can only be estimated at feasibility stage unless trial holes are undertaken. They are best suited to constant low-grade heating such as under floor heating as this maximizes the efficiency of energy production.

The main requirements of a horizontal ground loop GSHP system, is sufficient space to lay the pipework. A vertical borehole system would be the only option available for the site, however the number of boreholes, which will be in the region of 100m deep, would be limited, which would restrict the amount of useable heat. The boreholes are drilled at 5-6 m apart from each other and at 6-7 m from the nearest building. 3No boreholes of 80 to 110 m deep would typically provide circa 15kW of heat.

The cost of a GSHP heating system would be significant, particularly as cooling is a requirement. We do not feel that the relatively small improvement in system efficiency, would justify the increased capital cost involved.

ii) Air to Water Heat Pumps

Air to Water Heat Pumps utilise electricity to remove heat from the outside air to heat water to feed heating and hot water systems.

Air source heat pumps, which heat exchange with the air outside, are cheaper to install than ground source heat pumps, however, these are less efficient on the coldest days.

These systems can produce Low Temperature Hot Water (LTHW) and Chilled Water (CHW), although their capital costs are significantly higher than for a refrigerant installation, as outlined below.

iii) Air to Air Heat Pumps

Air to air heat pumps utilise refrigerant pipework, to transfer heat from an area to, or from, outside, to provide heating or cooling to the space. Whilst these units generally use electricity as their primary fuel source, they are highly efficient and would prove to be even more cost effective when used together with PV panel arrangements, where on-site generated electricity could be used for heating and cooling.

This type of installation would be of the lowest capital cost, when compared to the other system options.

4.2.2 Photovoltaic Installations

Photovoltaic systems convert energy from the sun into electricity through semi-conductor cells. Arrays of these panels are connected to an inverter to turn their DC output into AC current for use in the building, with any surplus sold back to the grid.

PV systems only require daylight and do not require direct sunlight to generate electricity, although more electricity is produced in brighter sunlight.

The building incorporates large expanses of roof which is ideal for these installations. We are proposing to maximise the installation of PV panels, with suitable room to allow access and maintenance of all panels.

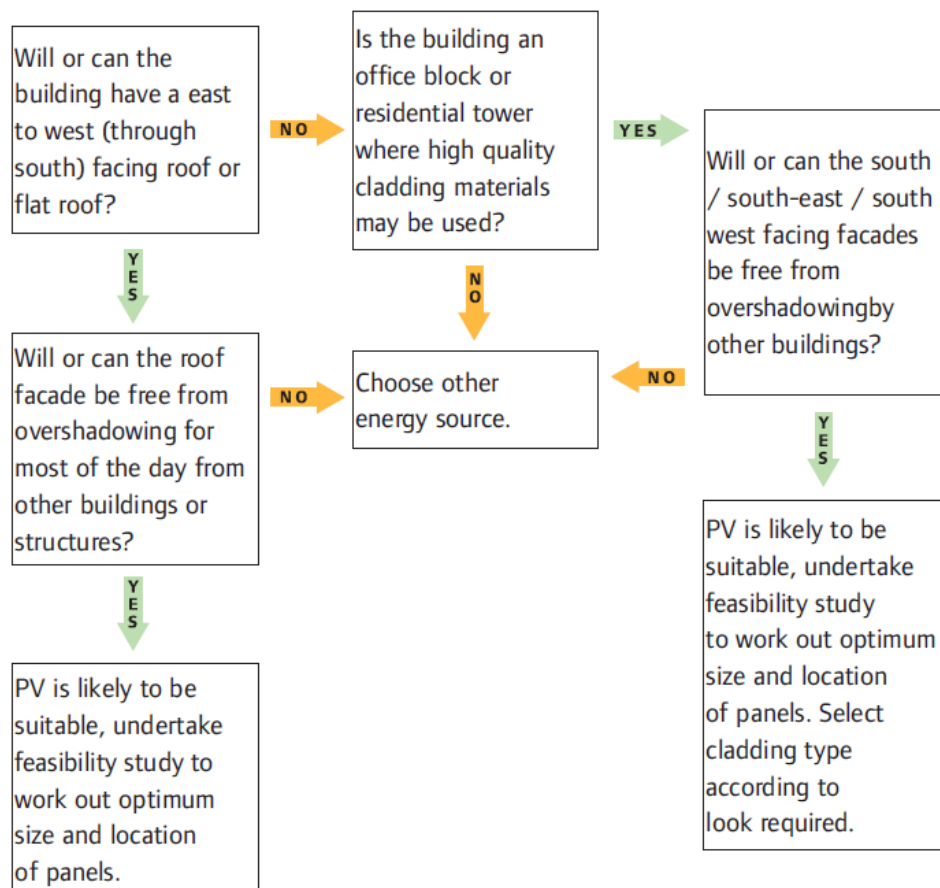


Please refer to the PV Assessment, which can be found within the Appendices of this report.

It is proposed that a 700 kWp Photovoltaic array is installed upon the units easterly and westerly facing rooves. This will produce energy to supply the site and reduce its overall energy demand and carbon emissions.

It is estimated that this will contribute over 550 MWh of electricity per annum. To maximise the energy produced, battery storage should be considered, so that the generated energy can be used out of daylight hours (see later in this report).

Guide for the Suitability of Photovoltaic Panels



4.2.3 Battery Storage

Viridian has undertaken a review of battery storage options, to capture and store electricity generated on site from photovoltaic panels, for use during no-daylight hours.

This is important for balancing supply and demand, especially when integrating intermittent renewable sources like solar into the grid. With advancements in energy storage technologies, businesses can reduce reliance on grid power, minimize costs, and enhance sustainability.

The cost of battery storage has reduced significantly in recent years. For example, on a recent project, a 215kW battery installation cost £54k.

The battery could feed the electricity requirements out of daylight hours and could act as back-up power for essential systems. This can also be utilised to feed car charging points as outlined below.

The requirement for battery storage is to be developed during detailed design of the MEP services installations and Sheldon's operational requirements.

4.2.4 Electric Vehicle Charging points

We understand that there is a planning requirement of a minimum of 20% of all staff spaces to have an EV charging point and that all staff spaces have infrastructure installed, to facilitate future installations.

A total of 10 no. EV charging points are currently proposed within the 43 office/visitor car parking spaces, of which 2No are allocated to accessible parking spaces.

Floor cleaners, forklift and pallet trucks will also be provided with charging points.

4.2.5 Water Use Reduction, including Rainwater Recycling

Water efficiency calculations will be undertaken during the design development, to ensure that water use on site is minimised and below that of Building Regulations requirements.

Rainwater harvesting will be reviewed further as to its feasibility. This utilises water from the roof, where it is filtered and stored in a tank, from where it is pumped on demand to toilets, washing machines and irrigation systems etc.

The Bakery has a large area of roof, which will be suitable to capture large quantities of water. The storage tank(s) can be either below, or above the ground, which would avoid excavation requirements.

A study of the anticipated use will be undertaken, to determine whether this technology is worthy of further consideration.

By storing the rainwater, this will help reduce the discharge from the site, although SuDs drainage is being proposed for this purposes, given the likely stored volume of water required would not meet the reduction in site run off requirement.

We have discounted the use of Greywater recycling at this stage, given the cost of installation, increased level of maintenance required and the reduced likely use for Greywater.

Appendix A As Designed Thermal Model and Anticipated EPC Rating

BRUKL Output Document

Compliance with England Building Regulations Part L 2021



Project name

Sheldon's Bakery

As designed

Date: Mon Jun 02 15:22:56 2025

Administrative information

Building Details

Address:

Certifier details

Name: John Hughes

Telephone number: 01614786256

Address: Viridian, Manchester, M2 5WA

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: iSBEM

Interface to calculation engine version: v6.1.e

BRUKL compliance module version: v6.1.e.0

Foundation area [m²]: 7937

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	2.26
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	0.46
Target primary energy rate (TPER), kWh _{PE} /m ² .annum	23.54
Building primary energy rate (BPER), kWh _{PE} /m ² .annum	-5.7
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.2	0.2	z/03/e
Floors	0.18	0.07	0.09	z/05.01/f
Pitched roofs	0.16	0.2	0.2	z/03/c
Flat roofs	0.18	-	-	No heat loss flat roofs
Windows** and roof windows	1.6	1.2	1.2	z/05.01/e/g
Rooflights***	2.2	-	-	No external rooflights
Personnel doors [^]	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² 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/m ² K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Page 1 of 5

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	NO
Whole building electric power factor achieved by power factor correction	0.9 to 0.95

1- AHU

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	3	-
Standard value	2.5*	N/A	N/A	2^	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.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

2- AC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Default HWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.9	0.015
Standard value	0.91	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
z/05.01		-	-	-	-	0.6	-	-	-	-	0.9	N/A
z/05.02		-	-	-	-	0.6	-	-	-	-	0.9	N/A
z/05.03		-	-	-	-	0.6	-	-	-	-	0.9	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
z/01		90	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
z/02		90	-	-
z/04		90	-	-
z/03		90	-	-
z/05.01		95	-	-
z/05.02		90	-	-
z/05.03		90	-	-

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?
z/02	N/A	N/A
z/04	N/A	N/A
z/03	N/A	N/A
z/05.01	NO (-2.5%)	NO
z/05.02	NO (-2.5%)	NO
z/05.03	NO (-2.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	6443	6443		Retail/Financial and Professional Services
External area [m ²]	12573.9	12573.9		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	MAN	MAN		Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	5	100	General Industrial and Special Industrial Groups
Average conductance [W/K]	2062.1	3135.96		Storage or Distribution
Average U-value [W/m ² K]	0.16	0.25		Hotels
Alpha value* [%]	8.51	39.91		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

* 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	6.15	6.49
Cooling	10.62	3.52
Auxiliary	36.16	6.17
Lighting	13.17	8.38
Hot water	3.42	2.18
Equipment*	97.13	97.13
TOTAL**	69.52	26.74

* 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	74.29	10.94
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>74.29</i>	<i>10.94</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	445.18	457.33
Primary energy [kWh _{PE} /m ²]	-5.7	23.54
Total emissions [kg/m ²]	0.46	2.26

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] No Heating or Cooling										
Actual	36.6	573.7	0	0	0	0	0	0	0	
Notional	82.8	597.2	0	0	0	0	0	----	----	
[ST] Constant volume system (variable fresh air rate), [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	228.7	34.2	21.5	7.6	116.5	2.96	1.25	3	3	
Notional	141.8	68.5	14.9	4.3	19.4	2.64	4.4	----	----	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	1.3	302.1	0.1	39.4	3.3	2.8	2.13	3	3	
Notional	98.9	168.9	10.4	10.7	2.9	2.64	4.4	----	----	

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

SBEM Main Calculation Output Document

Mon Jun 02 15:22:54 2025

v6.1.e.0

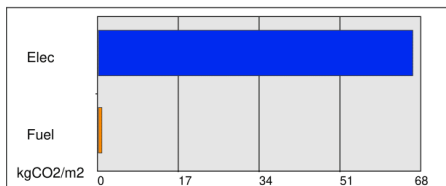
Building name

Sheldon's Bakery

Building type: General Industrial and Special Industrial Groups

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for England and Wales, Section 6 for Scotland, Part F for Northern Ireland, and Building Bye-laws Jersey Part 11) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, **SBEM is not intended as a building design tool.**

Building Energy Performance and CO2 emissions

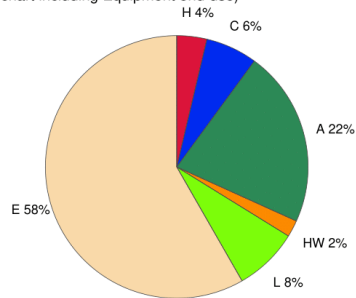


9.4 kgCO2/m2 displaced by the use of renewable sources.

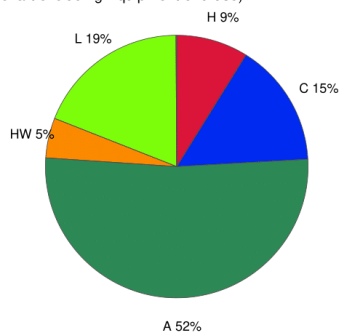
Building area is 6443 m2

Annual Energy Consumption

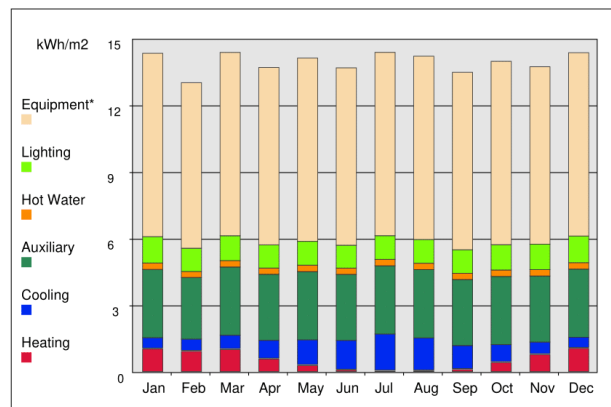
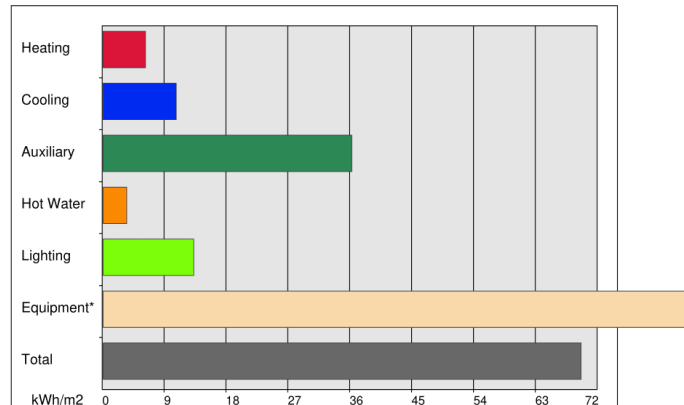
(Pie chart including Equipment end-use)



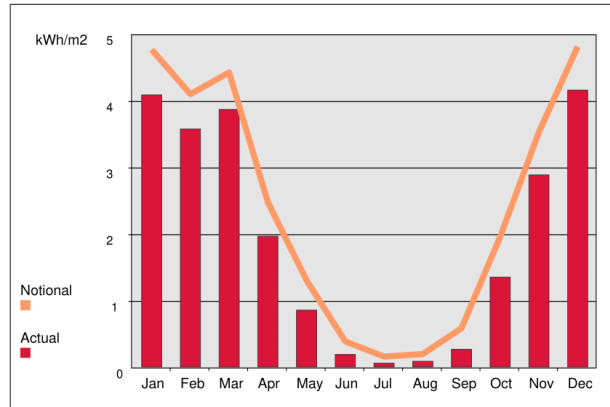
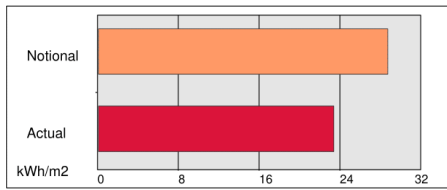
(Pie chart excluding Equipment end-use)



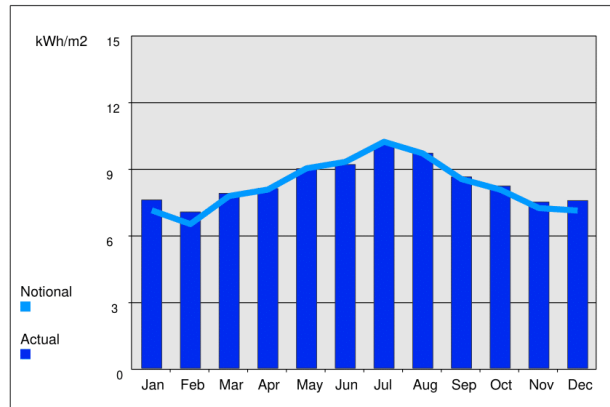
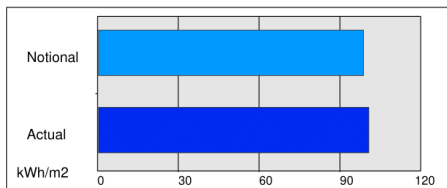
(*) Although energy consumption by equipment is shown in the graphs for information, this end-use has not been included in the total results of the building or the calculation of the ratings.



Annual Heating Demand



Annual Cooling Demand



Energy Performance Certificate

Non-Domestic Building



Certificate Reference Number:
2103-8706-0064-0190-0306

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient



Net zero CO₂ emissions

A 0-25



This is how energy efficient the building is.

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Air Conditioning
Total useful floor area (m ²):	6443
Building complexity:	Level 3
Building emission rate (kgCO ₂ /m ² per year):	0.46
Primary energy use (kWh _{pe} /m ² per year):	-5.7

Benchmarks

Buildings similar to this one could have ratings as follows:

7	If newly built
28	If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

Assessment Software:	iSBEM v6.1.e using calculation engine SBEM v6.1.e.0
Property Reference:	UPRN-000000000000
Assessor Name:	John Hughes
Assessor Number:	LCEA001633
Accreditation Scheme:	CIBSE Certification Limited
Assessor Qualifications:	NOS4
Employer/Trading Name:	Viridian Consulting Engineers Ltd
Employer/Trading Address:	Lloyds House, Lloyd Street, Manchester M6 7QP
Issue Date:	03 Jun 2025
Valid Until:	02 Jun 2035 (unless superseded by a later certificate)
Related Party Disclosure:	Not related to the owner

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 2381-8962-7586-5528-8874

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by CIBSE Certification Limited. You can obtain contact details of the Accreditation Scheme at www.cibsecertification.com.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.ndepcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit www.ndepcregister.com. To opt out of having information about your building made publicly available, please visit www.ndepcregister.com/optout.

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

Appendix B PV Assessment

Lloyds House • 18 Lloyd Street • Manchester M2 5WA

Lloyds House
18 Lloyd Street
Manchester M2 5WA

Tel.: 0161 478 6256
E-Mail: general@viridian-consulting.co.uk
Internet: www.viridian-consulting.co.uk

Project: G H Sheldon Bakery
Project number: ---

Location: United Kingdom / Liverpool
Grid voltage: 400V (3~)

System overview

260 x Hengdian Group DMEGC Magnetic Co. Ltd. DM450M10RT-B54HBB (08/2024) (Building 1: Area 1 (East))
Azimuth angle: -85 °, Tilt angle: 6 °, Mounting type: Roof, Peak power: 117.00 kWp, Bifacial Gain: 0 %

260 x Hengdian Group DMEGC Magnetic Co. Ltd. DM450M10RT-B54HBB (08/2024) (Building 1: Area 2 (West))
Azimuth angle: 95 °, Tilt angle: 6 °, Mounting type: Roof, Peak power: 117.00 kWp, Bifacial Gain: 0 %

260 x Hengdian Group DMEGC Magnetic Co. Ltd. DM450M10RT-B54HBB (08/2024) (Building 2: Area 3 (East))
Azimuth angle: -85 °, Tilt angle: 6 °, Mounting type: Roof, Peak power: 117.00 kWp

260 x Hengdian Group DMEGC Magnetic Co. Ltd. DM450M10RT-B54HBB (08/2024) (Building 2: Area 4 (West))
Azimuth angle: 95 °, Tilt angle: 6 °, Mounting type: Roof, Peak power: 117.00 kWp

260 x Hengdian Group DMEGC Magnetic Co. Ltd. DM450M10RT-B54HBB (08/2024) (Building 3: Area 5 (East))
Azimuth angle: -85 °, Tilt angle: 6 °, Mounting type: Roof, Peak power: 117.00 kWp

260 x Hengdian Group DMEGC Magnetic Co. Ltd. DM450M10RT-B54HBB (08/2024) (Building 3: Area 6 (West))
Azimuth angle: 95 °, Tilt angle: 6 °, Mounting type: Roof, Peak power: 117.00 kWp

 **2 x SMA STP110-60 (CORE2)**

 **1 x SMA STP110-60 (CORE2)**

 **2 x SMA STP110-60 (CORE2)**

 **1 x SMA STP110-60 (CORE2)**

PV design data

Total number of PV modules:	1560	Energy usability factor:	100 %
Peak power:	702.00 kWp	Performance ratio*:	87 %
Number of PV inverters:	6	Spec. energy yield*:	784 kWh/kWp
Nominal AC power of the PV inverters:	660.00 kW	Line losses (in % of PV energy):	---
AC active power:	660.00 kW	Unbalanced load:	0.00 VA
Active power ratio:	94 %	CO ₂ reduction after 20 years:	3,696 t
Annual energy yield*:	550.38 MWh		

*Important: The yield values displayed are estimates. They are determined mathematically. SMA Solar Technology AG accepts no responsibility for the real yield value which can deviate from the yield values displayed here. Reasons for deviations are various external conditions, such as soiling of the PV modules or fluctuations in the efficiency of the PV modules.

Information

Project: G H Sheldon Bakery
Project number: ---

Location: United Kingdom / Liverpool

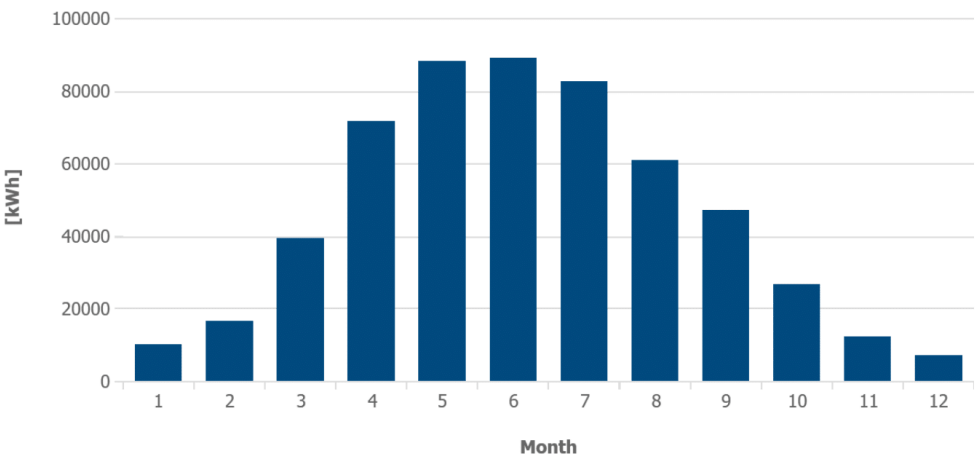
✓ G H Sheldon Bakery
✓ Subproject 1
✓ 2 x SMA STP110-60 (CORE2) (PV system section 1)
<i>i</i> You get this inverter including SMA ShadeFix. SMA ShadeFix is a patented inverter software that automatically optimizes the yield of PV systems in any situation. Even under shading conditions.
✓ 1 x SMA STP110-60 (CORE2) (PV system section 2)
<i>i</i> You get this inverter including SMA ShadeFix. SMA ShadeFix is a patented inverter software that automatically optimizes the yield of PV systems in any situation. Even under shading conditions.
✓ 2 x SMA STP110-60 (CORE2) (PV system section 3)
<i>i</i> You get this inverter including SMA ShadeFix. SMA ShadeFix is a patented inverter software that automatically optimizes the yield of PV systems in any situation. Even under shading conditions.
✓ 1 x SMA STP110-60 (CORE2) (PV system section 4)
<i>i</i> You get this inverter including SMA ShadeFix. SMA ShadeFix is a patented inverter software that automatically optimizes the yield of PV systems in any situation. Even under shading conditions.

Monthly values

Project: G H Sheldon Bakery
Project number: ---

Location: United Kingdom / Liverpool

/ Energy yield



Month	Energy yield [kWh]	Performance ratio
1	10163 (1.8 %)	82 %
2	16526 (3.0 %)	85 %
3	39324 (7.1 %)	87 %
4	71403 (13.0 %)	89 %
5	88122 (16.0 %)	88 %
6	88816 (16.1 %)	88 %
7	82476 (15.0 %)	87 %
8	60840 (11.1 %)	86 %
9	47020 (8.5 %)	86 %
10	26520 (4.8 %)	85 %
11	12173 (2.2 %)	83 %
12	6998 (1.3 %)	80 %