

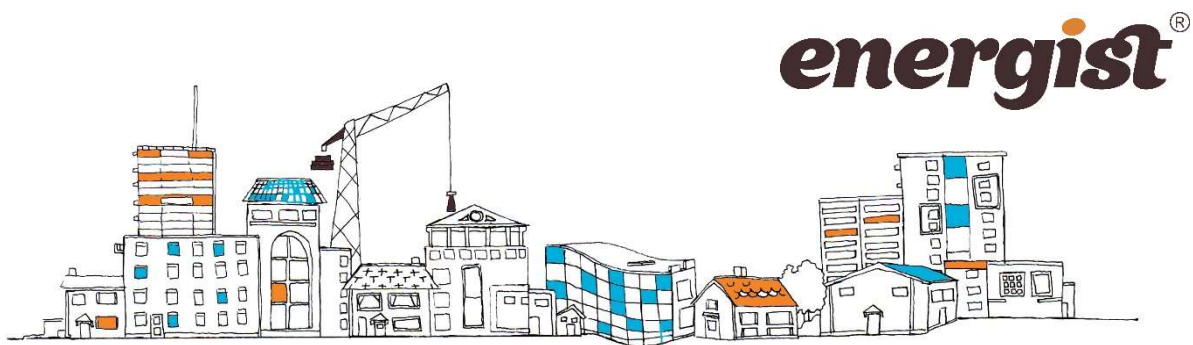
Energy Report

Chilcomb South Block

On behalf of Cavendish and Gloucester plc

Revision B

Date: 25th June 2018



REVISION HISTORY

Revision	Issue Date	Description	Issued By	Checked By
A	21/06/2018	Original Document	WOB	SH
B	25/06/2018	Revised to include BREEAM	WOB	SH

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Calculations contained within this report have been produced based on information supplied by the Client and the design team. Any alterations to the technical specification on which this report is based will invalidate its findings.

Energist
College Farm
Tetbury Road
Cirencester
GL7 6PY

Tel: 08458 386 387

info@energistuk.co.uk
www.energistuk.co.uk

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1. EXECUTIVE SUMMARY

This Energy Report has been produced by Energist UK on behalf of Cavendish and Gloucester plc ('the Applicant').

It will lay out the current Energy Strategy planned by the Applicant to achieve CO₂ reductions at the proposed development site: Chilcomb Business Centre, South Block ('the Development') compared to the initial scheme Energy Strategy.

The initial strategy developed by Gifford in August 2011 included a central biomass boiler as the preferred heating solution for the scheme. The applicant has since revised the strategy to include air source heat pumps (ASHP) as the preferred heating source as opposed to the biomass boiler.

This report will also assess the proposed strategies against the BREEAM Ene01 section "Reduction of energy use and carbon emissions". The Development is required to achieve a BREEAM Excellent rating for which 5 credits are required in the Ene01 section as a minimum.

The Energy Report concludes that the current strategy using an ASHP will still allow the development to reduce CO₂ emissions by 20% over Part L 2013 and achieve at least 5 credits in Ene01.

2. INTRODUCTION

2.1 Site Description

This Energy Report has been prepared for the non-residential development at Chilcomb Business Centre, South Block.

The Development consists of two office blocks (North and South), associated infrastructure and soft landscaping. It is located on the eastern outskirts of Winchester on the A31 and lies on the very edge of the south Downs to the East. This report will focus on the South Block only which is currently under construction.

Map 1: Site location for Chilcomb Business Centre showing South Block under construction.



Source: Google Maps

2.2 Purpose of the Energy Report

This report sets out how the energy strategy has changed due to the replacement of the preferred biomass heating source with a strategy using ASHP. The report will include modelled examples showing the effects on CO₂ emissions.

The original Energy Strategy as set out by Gifford in August 2011 included a recommendation for using a biomass boiler and PV panels to allow for a 20% renewable contribution for the whole site.

It is the understanding of Energist UK that the Applicant has stepped away from the proposed strategy due to financial viability and the preferred solution is to use ASHPs and target a 20% reduction in CO₂ over Part L 2013.

The development is required to achieve BREEAM Excellent certification and the minimum standard to achieve an Excellent rating is to achieve at least 5 BREEAM credits in Ene01- Reduction of energy use and carbon emissions. The new strategy using ASHPs will need to be able to attain this minimum standard.

3. BASELINE ENERGY DEMAND

3.1 Introduction

In order to measure the difference in heating strategies, it is first necessary to calculate the baseline energy demand and this has been done using SBEM 5.2g methodology. This can also be referred to as the Target Emission Rate (TER.)

The resulting ADL 2013 TER for Chilcomb Business Centre, South Block has been calculated using Part L model designs which have been applied to the Applicant's Development details. The TER, or baseline energy demand, represents the maximum CO₂ emissions that are permitted for the building in order to comply with ADL 2010.

3.2 The Development Baseline

The resulting TER, representing the total maximum CO₂ emissions permitted for the Development, has been calculated as 10.7kgCO₂/m² per annum for a biomass boiler strategy and 16.4kgCO₂/m² per annum for a strategy using ASHP. To ensure compliance with ADL 2010, CO₂ emissions should not exceed this figure.

4. MODELLING RESULTS

4.1 Biomass as Heat Source

The As Designed building has been modelled using a biomass boiler as the heat source. The resulting CO₂ emissions from this strategy are presented below. The detailed modelling results can be found in Appendix A.

CO emission rate from the notional building, kgCO ₂ /m ² /annum	10.7
Target CO emission rate (TER), kgCO ₂ /m ² /annum	10.7
Building CO emission rate (BER), kgCO ₂ /m ² /annum	8
Percentage reduction in CO ₂ emissions over the TER	25.2%

The use of a biomass boiler provides a reduction in CO₂ emissions of 25.2% for the As Designed building.

4.2 ASHP as Heat Source

The As Designed building has been modelled using ASHPs as the heat source. The resulting CO₂ emissions from this strategy are presented below. The detailed modelling results can be found in Appendix B.

CO emission rate from the notional building, kgCO ₂ /m ² /annum	16.4
Target CO emission rate (TER), kgCO ₂ /m ² /annum	16.4
Building CO emission rate (BER), kgCO ₂ /m ² /annum	13
Percentage reduction in CO ₂ emissions over the TER	20.7%

5. BREEAM

BREEAM Excellent is required for the Development at Chilcomb Business Centre. To achieve this at least 5 credits must be achieved for the SBEM energy modelling results. This section sets out the BREEAM Credits achieved when the SBEM Brukl Report information is input into the BREEAM Assessment Calculator Tool.

5.1 Biomass as Heat Source

The Brukl report data for the biomass boiler strategy achieves 9 credits when input into the BREEAM calculator as shown below. This is sufficient to achieve the BREEAM Excellent minimum standard.

ENERGY

Ene 01 Reduction of energy use and carbon emissions

No. of BREEAM credits available	12	Available contribution to overall score	8.57%
No. of BREEAM innovation credits available	5	Minimum standards applicable	Yes

Ene 01 Calculator

Country of the UK where the building is located	England	Confirm building regulation and version used:	England Part L2A 2013
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New Construction (shell and core)

Notional building heating and cooling energy demand	139.28	MJ/m ² yr
Actual building heating and cooling energy demand	130.29	MJ/m ² yr
Notional building primary energy consumption	78.13	kWh/m ² yr
Actual building primary energy consumption	55.71	kWh/m ² yr
Target emission rate (TER)	10.70	kgCO ₂ /m ² yr
Building emission rate (BER)	8.00	kgCO ₂ /m ² yr
Building emission rate improvement over TER	25.2%	
Heating & cooling demand energy performance ratio (EPR _{DEM})	0.126	
Primary consumption energy performance ratio (EPR _{PC})	0.325	
CO ₂ Energy performance ratio (EPR _{CO2})	0.266	
Overall building energy performance ratio (EPR _{NC})	0.716	

Where specified, please confirm the energy production from onsite or near site energy generation technologies	
Equivalent % of the building's 'regulated' energy consumption generated by carbon neutral sources and used to meet energy demand from 'unregulated' building systems or processes?	
Is the building designed to be 'carbon negative'?	
If the building is defined as 'carbon negative' what is the total (modelled) renewable/carbon neutral energy generated and exported?	

Total BREEAM credits achieved	9
Total contribution to overall building score	6.43%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	Outstanding level

5.2 ASHP as Heat Source

The Brukl report data for the ASHP strategy achieves 7 credits when input into the BREEAM calculator as shown below. This is also sufficient to achieve the BREEAM Excellent minimum standard.

ENERGY

Ene 01 Reduction of energy use and carbon emissions

No. of BREEAM credits available	12	Available contribution to overall score	8.57%
No. of BREEAM innovation credits available	5	Minimum standards applicable	Yes

Ene 01 Calculator

Country of the UK where the building is located	England	Confirm building regulation and version used:	England Part L2A 2013
---	---------	---	-----------------------

New Construction (shell and core)

Notional building heating and cooling energy demand	136.64	MJ/m2 yr
Actual building heating and cooling energy demand	133.86	MJ/m2 yr
Notional building primary energy consumption	95.10	kWh/m2 yr
Actual building primary energy consumption	76.82	kWh/m2 yr
Target emission rate (TER)	16.40	kgCO2/m2 yr
Building emission rate (BER)	13.00	kgCO2/m2 yr
Building emission rate improvement over TER	20.7%	
Heating & cooling demand energy performance ratio (EPR _{DEM})	0.049	
Primary consumption energy performance ratio (EPR _{PC})	0.283	
CO ₂ Energy performance ratio (EPR _{CO2})	0.233	
Overall building energy performance ratio (EPR _{NE})	0.565	

Where specified, please confirm the energy production from onsite or near site energy generation technologies	
Equivalent % of the building's 'regulated' energy consumption generated by carbon neutral sources and used to meet energy demand from 'unregulated' building systems or processes?	
Is the building designed to be 'carbon negative'?	
If the building is defined as 'carbon negative' what is the total (modelled) renewable/carbon neutral energy generated and exported?	

Total BREEAM credits achieved	7
Total contribution to overall building score	5.00%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	Excellent level

Assessor comments/notes:

11. CONCLUSIONS

The Applicant has commissioned Energist UK to report on the difference between the initial energy strategy using a biomass boiler as the primary heat source compared to the current strategy using ASHPs at Chilcomb Business Centre South Block. The modelling has shown that:

- The biomass boiler strategy provided a reduction in CO₂ emissions of 25.2% over Part L 2013.
- The current strategy using ASHPs provides a 20.7% reduction in CO₂ emissions over Part L 2013.

The results suggest that there is a minimal difference of less than 5% in reduction over Part L 2013.

The Applicant is required to achieve BREEAM Excellent certification for the Development. This requires a minimum of 5 credits to be achieved in BREEAM section Ene01 based on the SBEM models Brukl report to achieve the rating. This report concludes that both the biomass boiler strategy and the ASHP strategy achieve at least the 5 credits required for BREEAM Excellent.

12. APPENDICES

APPENDIX 1: SBEM RESULTS- BIOMASS

BRUKL Output Document HM Government

Compliance with England Building Regulations Part L 2013

Project name

South Block Chilcomb

As designed

Date: Wed Jun 20 15:26:39 2018

Administrative information

Building Details

Address: South Block, Chilcomb Park, WINCHESTER, SO21

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.4.a.1

Interface to calculation engine: Design Database

Interface to calculation engine version: v26.06.00.06

BRUKL compliance check version: v5.4.a.1

Owner Details

Name: PWP Architects

Telephone number: na

Address: 61 South Street, Havant, PO9 1BZ

Certifier details

Name: Steve Hull

Telephone number: 08458 386 387

Address: Energist UK, College Farm, Tetbury Road, Cirencester, Gloucestershire, GL7 6PY

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	10.7
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	10.7
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	8
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	Surface where the maximum value occurs*
Wall**	0.35	0.17	0.3	OFFICE SF Wall 3
Floor	0.25	0.14	0.14	CIRC GF Exposed Floor 1
Roof	0.25	0.18	0.18	CIRC SF Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	1	1	CIRC2 FF Window 1
Personnel doors	2.2	2.2	2.2	OFFICE1 GF Door 1 (Personnel Door)
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"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)] * There might be more than one surface where the maximum U-value occurs. ** 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. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	0.9 to 0.95

1- Boimass Boiler

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	-	-	-
Standard value	0.75	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system	YES				

1- Default DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

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	1.9	1.6	0.5	1.1	0.5	1		
CIRC FF		-	-	-	-	-	-	-	-	-	-	N/A
CIRC GF		-	-	-	-	-	-	-	-	-	-	N/A
CIRC SF		-	-	-	-	-	-	-	-	-	-	N/A
CIRC2 FF		-	-	-	-	-	-	-	-	-	-	N/A
LOBBY		-	-	-	-	-	-	-	-	-	-	N/A
OFFICE SF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
OFFICE1 FF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
OFFICE1 GF		0.3	-	-	0.6	-	-	-	-	-	0.83	0.5
OFFICE2 FF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
OFFICE2 GF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
RECEPTION		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS SF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS1 GF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS1 FF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS2 FF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS2 GF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS2 SF		-	-	-	-	-	-	-	-	-	-	N/A

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	1.9	1.6	0.5	1.1	0.5	1		
STORAGE GF		-	-	-	-	-	-	-	-	-	-	N/A
WC FF		-	-	0.5	-	-	-	-	-	-	-	N/A
WCS SF		-	-	0.5	-	-	-	-	-	-	-	N/A
PLANT FF		-	-	-	-	-	-	-	-	-	-	N/A
PLANT GF		-	-	-	-	-	-	-	-	-	-	N/A
PLANT SF		-	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
CIRC FF		-	259	-	126
CIRC GF		-	307	-	99
CIRC SF		-	252	-	125
CIRC2 FF		-	220	-	119
LOBBY		-	151	-	50
OFFICE SF		149	-	-	3386
OFFICE1 FF		152	-	-	1083
OFFICE1 GF		152	-	-	1063
OFFICE2 FF		149	-	-	2187
OFFICE2 GF		149	-	-	2192
RECEPTION		-	230	50	232
STAIRS SF		-	240	-	88
STAIRS1 GF		-	182	-	117
STAIRS1 FF		-	205	-	108
STAIRS2 FF		-	163	-	133
STAIRS2 GF		-	170	-	131
STAIRS2 SF		-	323	-	65
STORAGE GF		79	-	-	41
WC FF		-	141	-	226
WCS SF		-	137	-	223
PLANT FF		58	-	-	234
PLANT GF		58	-	-	240
PLANT SF		56	-	-	234

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
OFFICE SF	NO (-31.6%)	NO
OFFICE1 FF	NO (-61.5%)	NO
OFFICE1 GF	NO (-61.1%)	NO
OFFICE2 FF	NO (-18.7%)	NO
OFFICE2 GF	NO (-20.8%)	NO
RECEPTION	NO (-36.6%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m ²]	2442.3	2442.3		A1/A2 Retail/Financial and Professional services
External area [m ²]	3488.9	3488.9		A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
Weather	SOU	SOU	100	B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	4	3		B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	1402.74	1639.8		B8 Storage or Distribution
Average U-value [W/m ² K]	0.4	0.47		C1 Hotels
Alpha value* [%]	17.65	12.72		C2 Residential Institutions: Hospitals and Care Homes
				C2 Residential Institutions: Residential schools
				C2 Residential Institutions: Universities and colleges
				C2A Secure Residential Institutions
				Residential spaces
				D1 Non-residential Institutions: Community/Day Centre
				D1 Non-residential Institutions: Libraries, Museums, and Galleries
				D1 Non-residential Institutions: Education
				D1 Non-residential Institutions: Primary Health Care Building
				D1 Non-residential Institutions: Crown and County Courts
				D2 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	7.21	14.21
Cooling	0	0
Auxiliary	4.26	4.42
Lighting	10.75	15.69
Hot water	2.77	3.56
Equipment*	41.64	41.64
TOTAL**	25	37.88

* 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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	130.29	139.28
Primary energy* [kWh/m ²]	55.71	78.13
Total emissions [kg/m ²]	8	10.7

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Biomass, [CFT] Electricity									
Actual	22.6	111.4	7.4	0	4.4	0.85	0	0.9	0
Notional	33.1	110.1	14.6	0	4.5	0.63	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	CIRC2 FF Wall 1
Floor	0.2	0.14	CIRC GF Exposed Floor 1
Roof	0.15	0.18	CIRC SF Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1	CIRC2 FF Window 1
Personnel doors	1.5	2.2	OFFICE1 GF Door 1 (Personnel Door)
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

APPENDIX 2: SBEM RESULTS- ASHP

BRUKL Output Document



Compliance with England Building Regulations Part L 2013

Project name

South Block Chilcomb

As designed

Date: Wed Jun 20 15:39:02 2018

Administrative information

Building Details

Address: South Block, Chilcomb Park, WINCHESTER, SO21

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.4.a.1

Interface to calculation engine: Design Database

Interface to calculation engine version: v26.06.00.06

BRUKL compliance check version: v5.4.a.1

Owner Details

Name: PWP Architects

Telephone number: na

Address: 61 South Street, Havant, PO9 1BZ

Certifier details

Name: Steve Hull

Telephone number: 08458 386 387

Address: Energist UK, College Farm, Tetbury Road, Cirencester, Gloucestershire, GL7 6PY

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	16.4
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	16.4
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	13
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{0-Limit}	U _{0-Calc}	U _{i-Calc}	Surface where the maximum value occurs*
Wall**	0.35	0.17	0.3	OFFICE2 FF Wall 2
Floor	0.25	0.14	0.14	OFFICE2 GF Exposed Floor 1
Roof	0.25	0.18	0.18	CIRC SF Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	1	1	OFFICE SF Window 2
Personnel doors	2.2	2.2	2.2	OFFICE1 GF Door 1 (Personnel Door)
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
U _{0-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{0-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² K)] * There might be more than one surface where the maximum U-value occurs. ** 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. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	0.9 to 0.95

1- S&C HVAC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	3.5	-	-	-
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					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- GF Reception

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.61	3.01	-	-	-
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					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

3- GF Small Office

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.55	4.23	-	-	-
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					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- FF DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.001
Standard value	1	N/A

2- SF DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.002
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

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	1.9	1.6	0.5	1.1	0.5	1		
CIRC FF		-	-	-	-	-	-	-	-	-	-	N/A
CIRC SF		-	-	-	-	-	-	-	-	-	-	N/A
OFFICE SF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
OFFICE1 FF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
OFFICE2 FF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
OFFICE2 GF		0.3	-	-	1	-	-	-	-	-	0.8	0.5
STAIRS SF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS1 FF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS2 FF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS2 GF		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS2 SF		-	-	-	-	-	-	-	-	-	-	N/A
WC FF		-	-	0.5	-	-	-	-	-	-	-	N/A
WCS SF		-	-	0.5	-	-	-	-	-	-	-	N/A
CIRC GF		-	-	-	-	-	-	-	-	-	-	N/A
CIRC2 FF		-	-	-	-	-	-	-	-	-	-	N/A
LOBBY		-	-	-	-	-	-	-	-	-	-	N/A
RECEPTION		-	-	-	-	-	-	-	-	-	-	N/A
STAIRS1 GF		-	-	-	-	-	-	-	-	-	-	N/A
OFFICE1 GF		0.3	-	-	0.6	-	-	-	-	-	0.83	0.5
STORAGE GF		-	-	-	-	-	-	-	-	-	-	N/A
PLANT FF		-	-	-	-	-	-	-	-	-	-	N/A
PLANT GF		-	-	-	-	-	-	-	-	-	-	N/A
PLANT SF		-	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
CIRC FF		-	259	-	126
CIRC SF		-	252	-	125
OFFICE SF		149	-	-	3386
OFFICE1 FF		152	-	-	1083
OFFICE2 FF		149	-	-	2187
OFFICE2 GF		149	-	-	2192
STAIRS SF		-	240	-	88
STAIRS1 FF		-	205	-	108
STAIRS2 FF		-	163	-	133
STAIRS2 GF		-	170	-	131
STAIRS2 SF		-	323	-	65
WC FF		-	141	-	226
WCS SF		-	137	-	223
CIRC GF		-	307	-	99
CIRC2 FF		-	220	-	119
LOBBY		-	151	-	50

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
RECEPTION		-	230	50	232
STAIRS1 GF		-	182	-	117
OFFICE1 GF		152	-	-	1063
STORAGE GF		79	-	-	41
PLANT FF		58	-	-	234
PLANT GF		58	-	-	240
PLANT SF		56	-	-	234

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
CIRC FF	N/A	N/A
CIRC SF	N/A	N/A
OFFICE SF	NO (-31.6%)	NO
OFFICE1 FF	NO (-61.5%)	NO
OFFICE2 FF	NO (-18.7%)	NO
OFFICE2 GF	NO (-20.8%)	NO
STAIRS SF	NO (-56.9%)	NO
STAIRS1 FF	NO (-48.3%)	NO
STAIRS2 FF	NO (-77.8%)	NO
STAIRS2 GF	NO (-83.6%)	NO
STAIRS2 SF	NO (-79.9%)	NO
WC FF	N/A	N/A
WCS SF	N/A	N/A
CIRC GF	N/A	N/A
CIRC2 FF	NO (-14.9%)	NO
LOBBY	YES (+26.2%)	NO
RECEPTION	NO (-36.6%)	NO
STAIRS1 GF	NO (-49.5%)	NO
OFFICE1 GF	NO (-61.1%)	NO
STORAGE GF	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m ²]	2442.3	2442.3		A1/A2 Retail/Financial and Professional services
External area [m ²]	3488.9	3488.9		A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
Weather	SOU	SOU	100	B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	4	3		B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	1398.87	1639.8		B8 Storage or Distribution
Average U-value [W/m ² K]	0.4	0.47		C1 Hotels
Alpha value* [%]	17.7	12.72		C2 Residential Institutions: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				C2 Residential Institutions: Residential schools
				C2 Residential Institutions: Universities and colleges
				C2A Secure Residential Institutions
				Residential spaces
				D1 Non-residential Institutions: Community/Day Centre
				D1 Non-residential Institutions: Libraries, Museums, and Galleries
				D1 Non-residential Institutions: Education
				D1 Non-residential Institutions: Primary Health Care Building
				D1 Non-residential Institutions: Crown and County Courts
				D2 General Assembly and Leisure, Night Clubs, and Theatres
				Others: Passenger terminals
				Others: Emergency services
				Others: Miscellaneous 24hr activities
				Others: Car Parks 24 hrs
				Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.79	3.38
Cooling	6.88	8.26
Auxiliary	3.28	3.43
Lighting	10.75	15.69
Hot water	2.57	2.74
Equipment*	41.64	41.64
TOTAL**	25.27	33.51

* 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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	133.86	136.64
Primary energy* [kWh/m ²]	76.82	95.1
Total emissions [kg/m ²]	13	16.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	21.5	117.2	1.7	7.3	3.7	3.43	4.48	3.5	6
Notional	26.7	112.5	3	8.7	3.7	2.43	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	57.1	93.6	4.5	7.6	0	3.54	3.44	3.61	4.6
Notional	70.7	83.8	8.1	6.5	0	2.43	3.6	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	17.6	102	1.1	5	2.9	4.46	5.64	4.55	7.54
Notional	39.1	104.4	4.5	8.1	4	2.43	3.6	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	OFFICE SF Wall 1
Floor	0.2	0.14	OFFICE2 GF Exposed Floor 1
Roof	0.15	0.18	CIRC SF Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1	OFFICE SF Window 2
Personnel doors	1.5	2.2	OFFICE1 GF Door 1 (Personnel Door)
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4