green tiger
SUSTAINABILITY

36 Wyke Avenue, Guilford
Energy Assessment
Planning Report

Prepared for:

Peter Snow

[redacted]

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Issue Status

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Revision Number	Issue Date:	Issue by:
Revision 1	13.05.2021	Ross Standaloft

DISCLAIMER

Contents

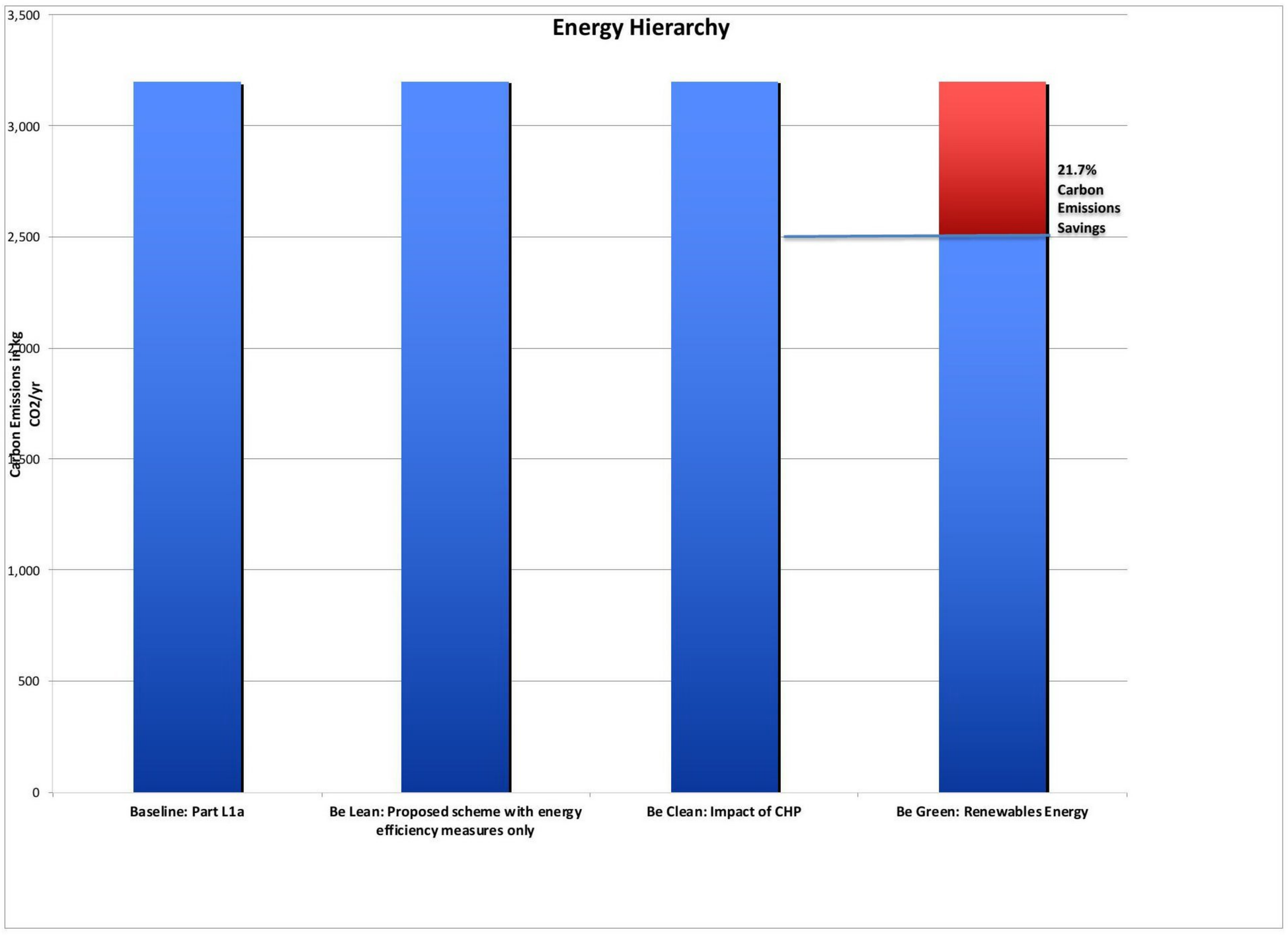
Executive Summary

INTRODUCTION	The proposed residential scheme at "36 Wyke Avenue" is required to make carbon emission reductions in accordance with the new 'Local Plan Policy D2: Climate Change, Sustainable Design'. The energy hierarchy approach should be taken and meet a target of 20% CO2 reduction over Part L.
AIM OF THIS STUDY	The aim of this revised study is to assess the feasible carbon emission reductions through building fabric, efficient services and low or zero carbon technologies to meet the 20% carbon reduction target from Local Plan policy D2. This report demonstrates how the site has followed the energy hierarchy by reducing energy demand through efficient fabric first, energy efficiency measures and generating renewable energy to further reduce the overall carbon emissions of the development.
METHODOLOGY	The 'Energy Hierarchy' methodology followed in this report follows the guidance set out by the Greater London Authority (GLA) for developing energy strategies as detailed on the following "GLA Energy Team Guidance on Planning Energy Assessments", 202. Energy consumption figures are based on SAP modelling data produced under Building Regulations Part L compliant software (SAP 2012). Analysis of the house has been undertaken to demonstrate compliance with the Building Regulations Part L1a 2013. The baseline scenario in this study based on the house was enhanced to PartL1a standards, or the Target Emission Rate (TER). Energy savings shown in this report are for Regulated emissions. These findings are subject to detailed analysis from a services engineer and quantity surveyor.

SITE DESCRIPTION	The proposed development consists of 2 residential dwellings together with car parking, areas of hard- standing and associated landscaping. The scheme is new build and aims to be designed to be in keeping with the local area.
TARGET – ENERGY	Guilford Council Local Plan policy D2 requires carbon reductions in line with the energy hierarchy i.e. the Lean, Clean, Green methodology. These reductions must be above and beyond PartL1a (TER), which will be the baseline calculation in this study. Overall carbon emission reductions are targeted at 20%, in line with 2013 standards (and subsequent revisions)

RECOMMENDATION	The energy strategy for the proposed scheme is to use best-practice energy efficiency fabric measures alongside a highly efficient Air Source Heat Pump to meet the carbon emissions reductions target set by Guilford Council. The proposal is to insulate the building to best practice standards, surpassing Part L1a 2013 requirements. The thermal performance targets of the dwelling are the following: U-Values of 0.15 W/m^{2}K for the ground floor, 0.15 W/m^{2}K for the roof, 0.18 W/m^{2}K for walls, windows of 1.4 W/m2K for windows. Air permeability of 4.5 m^3/m^2/hr for the houses is targeted and to be achieved on site. Thermal bridging will also be kept to a minimum with an average Y-value of 0.06, thus going beyond accredited construction details as a minimum. Ventilation will meet Part F requirements through natural / extract methods.
CO2 SAVINGS SUMMARY	The baseline carbon emissions for the scheme are 3,204 kgCO2/yr. Following implementation of measures within this report; a total saving of 697 kgCO2/yr will be made, a 21.7% overall carbon reduction. These measures include: - Be Lean (0.1% savings over baseline): Energy efficiency measures to improve the building fabric and services: Best practice performance U-Values (0.18 for walls, 0.15 for roof, 0.15 for the ground floor and 1.4 for windows in W/m^{2}K), air tightness - maximum of 4.5 m^3/m^2/hr at 50 Pa and best practice attention to thermal bridging at an average Y-value of 0.06. - Be Clean (0% savings over Lean case); No further savings through the use of CHP are planned. - Be Green (21.7% savings over clean case): Green energy generation to include a highly efficient Ecodan Air Source Heat pump to generate efficient heat and hot water for the scheme. The figures are summarized and represented in graphical form on the following page.
Part L 2013	The scheme will meet Building Regulations (Part L1a 2013) and subsequent revisions.

GLA's Energy Hierarchy				
	Baseline	Be Lean: Energy Efficiency Measures	Be Clean: CHP	Be Green: Renewable
Carbon emissions in $kgCO_2/yr$	3,204	3,204	3,204	2,507
Carbon emission savings in $kgCO_2/yr$	-	-	-	697
Percentage reduction in carbon emissions over the previous stage	-	0.1%	0%	21.7%



Planning Requirements

PLANNING REQUIREMENT	Guilford Council's Local Plan Strategy requires a minimum 20% reduction in carbon emissions through on-site renewable energy. Fabric and energy efficiency enhancements will first be calculated, and then on-site renewable energy technologies should be sought.
REQUIREMENTS FOR AN ENERGY STATEMENT	In line with Guilford Local Plan Policy D2, this report follows the Greater London Authority Supplementary Planning Guidance for energy hierarchy methodology. The guidance states major developments should be accompanied by an energy statement, which provides information as set out below: • Calculation of baseline energy demand and carbon dioxide emissions showing the contribution of emissions from building regulations • Proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services; • Proposals to further reduce carbon dioxide emissions through the use of decentralized energy where feasible, such as district heating and cooling and combined heat and power (CHP); and • Proposals to further reduce carbon dioxide emissions through the use of on-site low or zero carbon technologies technologies. A target of 20% reduction of carbon emissions from low or zero carbon technologies is required. An assessment of the feasibility of different renewable technologies on the site and the potential contribution to CO2 reduction from each option, explaining which technologies have been investigated and why any technologies have been ruled out, (i.e. technical and practical limitations etc).

Methodology

METHODOLOGY	The methodology followed in this report follows the guidance set out in GLA Energy Team Guidance on Planning Energy Assessments, 2020, as set out below. Energy consumption figures are based on SAP modeling data produced under Building Regulations Part L compliant software (SAP 2012). The analysis of the house has been undertaken to show the compliance with the Building Regulations Part L1a 2013.
ENERGY HIERARCHY Taken from GLA Energy Team Guidance on Planning Energy Assessments, 2020	The energy hierarchy takes a 'whole energy' approach and addresses energy efficiency use, energy supply efficiency and use of low or zero carbon technologies. The purpose is to demonstrate that climate change mitigation measures are integral to the scheme's design and evolution, and that they are appropriate to the context of the development. The below summarises the guidance for each stage.
BASELINE CALCULATIONS	See overleaf for the details of the baseline calculations in line with PartL1a.
BE LEAN	Demand reduction (Be Lean) measures specific to the scheme are encouraged at the earliest design stage of a development and aim to reduce to demand for energy. Measures typically include passive design: both architectural and building fabric measures, and active design: energy efficient services. It is possible to exceed Building Regulations requirements (Part L 2013) through demand reduction (Be Lean) measures alone.
BE CLEAN	A 'clean' energy supply refers to the energy efficiency of heating, cooling and power systems. Planning applications should demonstrate how the heating, cooling and power systems have been selected to minimise CO2 emissions in accordance with the order of preference in the London Plan policy SI 2.
BE GREEN	Use of Low Zero Carbon technologies in developments is encouraged at the 'Be Green' third stage. Each low or zero carbon technologies technology in Policy SI 2 of the London Plan 2021 is technically feasible in London and each should be considered in the Energy Assessment.

“Be Lean” Energy Efficiency measures

ENERGY EFFICIENCY TARGETS

Energy efficiency measures for the building fabric will be incorporated to reduce the energy demand and carbon footprint of the proposed scheme. The below measures don’t result in carbon emissions savings, but almost reach the current difficult Part L standards.

This is due to the new Part L1a standards, it is very difficult to make savings using fabric first measures only – all u-values have been pushed beyond Partl1a minimum standards.

U-VALUES TARGETED ACROSS SITE

Element	Building Regulations PartL1a 2013 U-Value (W/m^2K)	Proposed U-Value (W/m^2K)
Roof	0.20	0.15
Floor	0.25	0.15
Walls	0.30	0.18
Window	2.0	1.4

AIR-TIGHTNESS

In addition to the above u-values, a high-performance development with high air tightness levels is to be achieved such that the proposed scheme does not exceed an air permeability level of 4.5 $m^3/m^2/hr$ at 50 Pa during testing.

This will be achieved through ensuring that sensitive areas are accounted for in the design and construction phases to make certain that a tightly sealed building is constructed and all punctures through the seal are airtight. In particular, attention will be paid to openings such as services and down lighters at roof level. Accredited details will be followed to ensure that the average Y-Value across site will be no greater than 0.06. Each thermal bridge will be required to be calculated and shown that the 0.06 overall values are met.

ENERGY EFFICIENCY

In this scenario a highly efficient Logik ESP1 gas boiler (SEDBUK 91%) is specified per dwelling, for this scenario with interlock and weather compensator included. Heating will be delivered via efficient under floor heating and radiator mix.

In addition, 100% of internal lighting will be energy efficient.

VENTILATION

Ventilation will meet Part F requirements through natural methods.

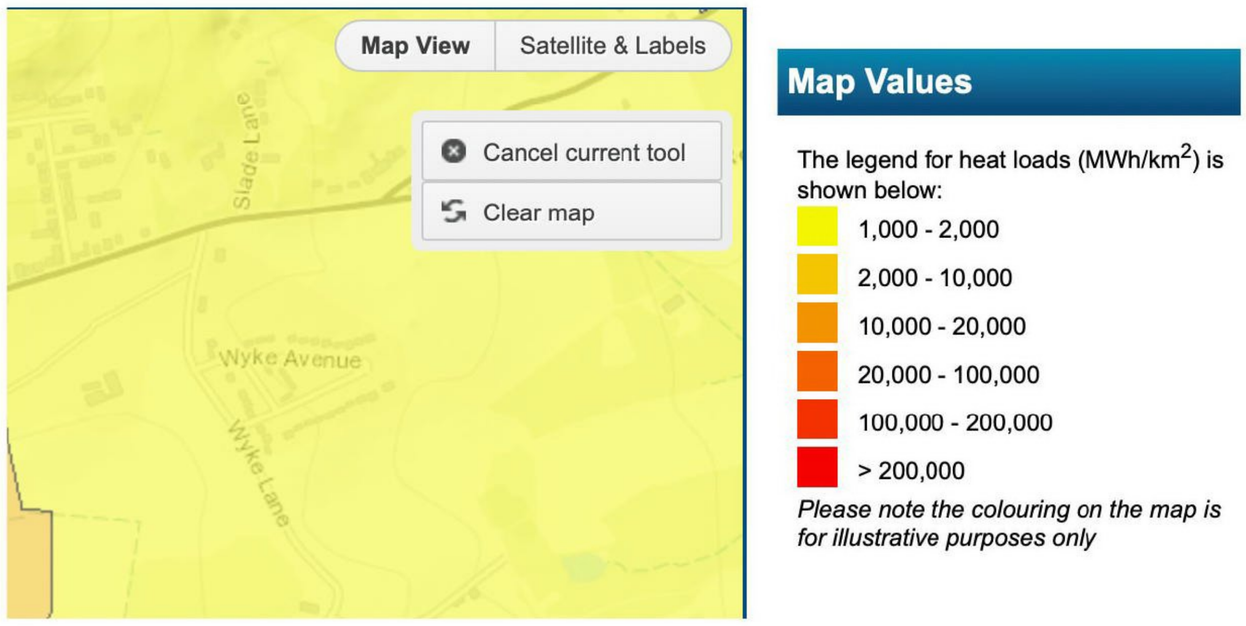
“Be Clean” Use of combined cooling, heat and power (CCHP)

USE OF COMBINED HEAT AND POWER

The inclusion of gas combined cooling, heat and power (CCHP) within the energy strategy has been considered and will not be included in the proposed as a viable option to reduce the carbon emissions of the scheme. This section demonstrates how decentralised energy generation has been considered in accordance with the CCHP heat map guidance. The following guidance hierarchy was followed:

Option One - Connection to existing CCHP/CHP networks

This option is deemed infeasible in this instance due to the lack if an existing CCHP/CHP network in the vicinity of the proposed development, as per heat map below (chptools.decc.gov.uk)



Option Two - Site wide CCHP/CHP generation powered by renewables

CCHP/CHP generation powered through renewables such as biomass is considered infeasible in this instance due to issues relating to air quality and delivery practicalities.

Option Three - Gas CCHP/CHP accompanied by renewables

A site-wide CHP is not deemed appropriate to the site on technical, financial and carbon savings grounds.

FRAMEWORK TO ANALYSE CHP

The CHP is analysed along the following points:

- The technical feasibility of CHP on a site-wide basis and for portions of the scheme.
- The viability of the CHP in terms of capital expenditure per unit.
- The carbon emissions reductions from the CHP as compared to an alternative system.

CHP ANALYSIS

Combined cooling, heat and power (CCHP) has been assessed in terms of feasibility. There are no existing local heat networks for connection. Instead fabric first approach to energy saving, pushing the heating demand down is sought. The potential for future connection to a network will be considered by project engineers.

"Be Green" renewable energy target

INTRODUCTION

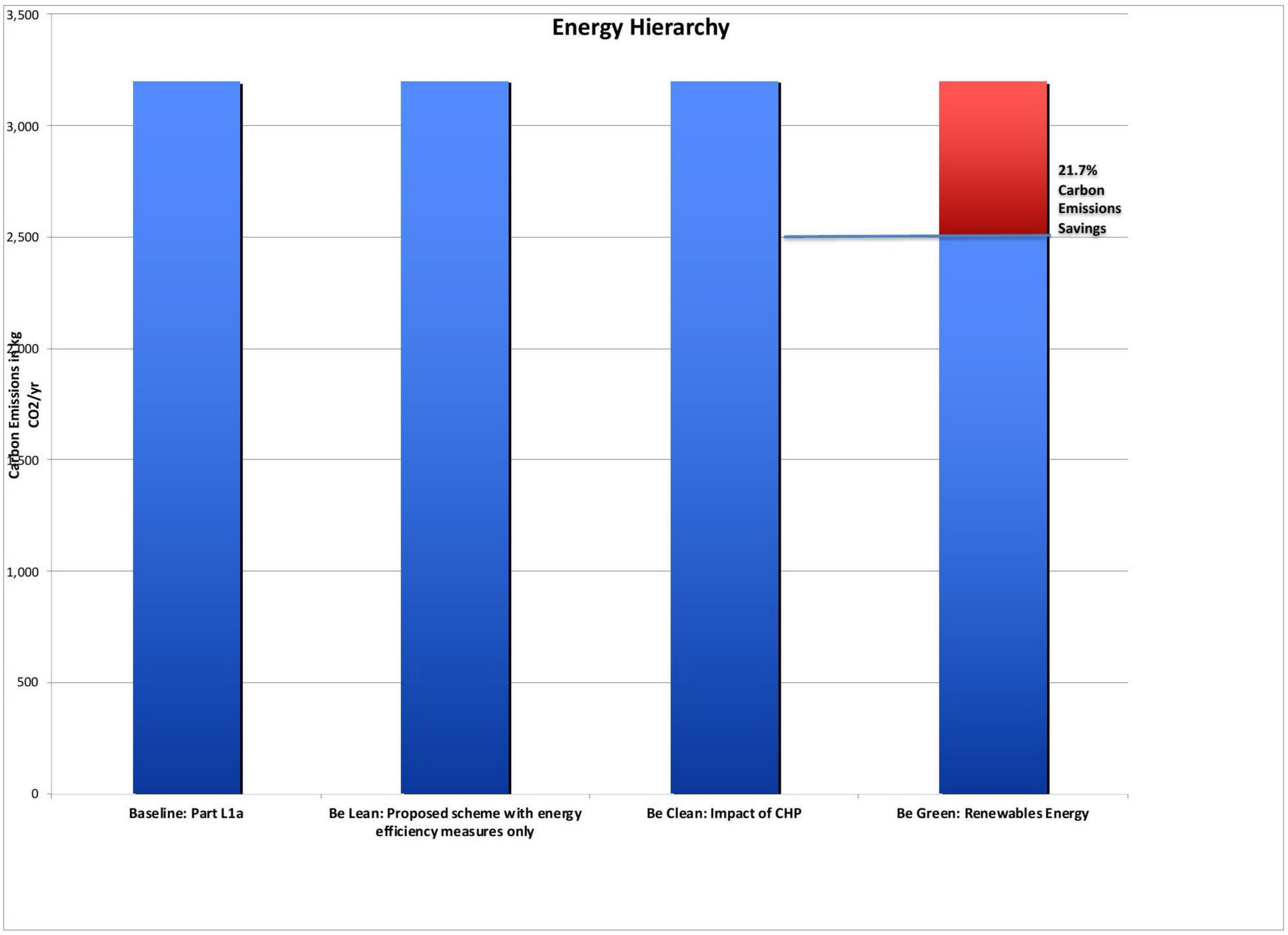
The predicted carbon emissions of the proposed scheme following energy efficiency measures and clean energy generation will be 3,204 kgCO2/yr in line with the methodology and details provided in this report.

In addition, further CO2 reduction is required after the above savings are accounted for, through the use of on-site renewable technologies. Air Source Heat Pumps have been identified as the ideal renewable energy sources for the following reasons:

- Future proof and will become more carbon efficient in time
- Last for 25 years +
- Not burning fossil fuels on-site

20% CARBON EMISSIONS REDUCTION TARGET

The Air Source Heat Pump technology is required to save a minimum total of 642 kgCO2/yr to surpass the target of 20%. The overall emissions reduction from the ASHP is 697 kgCO2/yr, which equates to 21.7% saving.



Feasible Renewable Energy technologies

FEASIBLE LOW OR ZERO CARBON TECHNOLOGIES

A reduction in carbon emissions through the use of on-site low or zero carbon technologies can be achieved through several technologies to generate either heat or power. Following the analysis of the carbon emissions related to the scheme, the objective of this section is to determine the feasible low or zero carbon technologies options that provide cost-effective and practical emissions reductions. The low or zero carbon technologies options for the proposed scheme are provided in the table below. Each technology is also assessed as either feasible or rejected based on its implications for the scheme in terms of their implementation, cost-effectiveness, site-related constraints, planning issues or others. The following sections will explore the feasible technologies in depth and explain why certain technologies have been rejected.

Technology and feasibility	Rationale
BIOMASS / REJECTED	Biomass would be able to provide a 20% overall reduction in carbon emissions. However, this technology would have a significant impact on local air quality in the Borough and development access restraints preclude the possibility of biomass pellet delivery.
LIQUID BIOFUEL/ REJECTED	Although biofuel has the capability to heat the site, as with solid biomass, liquid biofuel has air quality implications in addition to delivery and sourcing issues in a city centre location such as this.
AIR SOURCE HEAT PUMP (ASHP) / ACCEPTED	An air source heat pump can supply heating and hot water to the proposed scheme. There is space for outdoor condensing units and the solution would require no gas to be used on site. Air Source is also very carbon efficient in the future as the national grid 'greens'.
GROUND SOURCE HEAT PUMP / REJECTED	A ground source heat pump would be capable of heating the block; but is not feasible due to the relatively low hot water heat demand and huge space issues associated with the technology.
PHOTOVOLTAIC (PV) / FEASIBLE – NOT ACCEPTED	There are roof areas available to accommodate Solar PV panels. Along with fabric measures, this can reach the 20% target. The panels are aesthetically unpleasing though. Consequently, the PV panel is feasible, but ASHP is better solution for target.
SOLAR HOT WATER (SHW) / FEASIBLE – NOT ACCEPTED	As with Solar PV, Roof mounted SHW units could be located on the roof space area. If the roof space available were covered with solar collectors as appose to Solar PV, the carbon savings would be far less.
WIND TURBINE / REJECTED	Turbulence created from surrounding buildings makes this an inefficient solution and it would make a large visible impact.

“Be Green” renewable energy target

INTRODUCTION	It is proposed that in order to meet the Guilford Local Plan D2 requirements on production of clean energy, Air Source Heat Pumps are deemed a feasible and viable solution.
ASSUMPTIONS	The proposed procurement method is design and build. Therefore, it is not deemed necessary to specify specific ASHP unit at this early stage. Therefore, the calculations on ASHP have been based on a standard Mitsubishi Ecodan 8.5KW unit.
POTNETIAL SPECIFICATION	A suggested specification would consist of an 8.5KW Ecodan Air Source Heat Pump unit, with associated 250 litre hot water tank.  
DISCLAIMER	Note that all ASHP installations require full design and installation from the electric sub-contractor and/or a renewable specialist installer.

Conclusions

RECOMMENDATION

The energy strategy for the proposed scheme is to use best-practice energy efficiency fabric measures alongside a highly efficient Air Source Heat Pump to meet the carbon emissions reductions target set by Guilford Council.

The proposal is to insulate the building to best practice standards, surpassing Part L1a 2013 requirements. The thermal performance targets of the dwelling are the following: U-Values of 0.15 W/m^{2}K for the ground floor, 0.15 W/m^{2}K for the roof, 0.18 W/m^{2}K for walls, windows of 1.4 W/m2K for windows. Air permeability of 4.5 m^3/m^2/hr for the houses is targeted and to be achieved on site. Thermal bridging will also be kept to a minimum with an average Y-value of 0.06, thus going beyond accredited construction details as a minimum.

Ventilation will meet Part F requirements through natural / extract methods.

CO2 SAVINGS SUMMARY

The baseline carbon emissions for the scheme are 3,204 kgCO2/yr. Following implementation of measures within this report; a total saving of 697 kgCO2/yr will be made, a 21.7% overall carbon reduction. These measures include:

- Be Lean (0.1% savings over baseline): Energy efficiency measures to improve the building fabric and services: Best practice performance U-Values (0.18 for walls, 0.15 for roof, 0.15 for the ground floor and 1.4 for windows in W/m^{2}K), air tightness - maximum of 4.5 m^3/m^2/hr at 50 Pa and best practice attention to thermal bridging at an average Y-value of 0.06.

- Be Clean (0% savings over Lean case); No further savings through the use of CHP are planned.

- Be Green (21.7% savings over clean case): Green energy generation to include a highly efficient Ecodan Air Source Heat pump to generate efficient heat and hot water for the scheme.

The figures are summarized and represented in graphical form on the following page.

Part L 2013

The scheme will meet Building Regulations (Part L1a 2013) and subsequent revisions.

Appendix A

TER / DER Summary

Plot	Type	TER CO2	Lean CO2	Clean CO2	Green CO2
1	Semi	18.97	18.97	18.97	15.00
2	Semi	19.17	19.17	19.17	14.85

CO2 Emissions Summary

Plot	Type	Area	TER CO2	Lean CO2	Clean CO2	Green CO2
1	Semi	82.70	1,568.82	1,568.82	1,568.82	1,240.50
2	Semi	85.30	1,635.20	1,635.20	1,635.20	1,266.71

All SAP calculations sheets are attatched on the following pages.

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

Design SAP
elmhurst energy

Property Reference	Wyke Avenue	**Issued on Date**	12/05/2021
Assessment Reference	Plot 1 ASHP	**Prop Type Ref**	
Property	Wyke Avenue		

SAP Rating	87 B	**DER**	15.00	**TER**	27.52
Environmental	88 B	**% DER<TER**	45.49		
CO_2 Emissions (t/year)	1.04	**DFEE**	54.09	**TFEE**	56.77
General Requirements Compliance	Pass	**% DFEE<TFEE**	4.72		

Assessor Details	Mr. Nicky Bowen, Domestic Energy Solutions, Tel: 01455883250, nickybowen@sky.com	**Assessor ID**	D719-0001
Client			

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

Orientation	West
Property Tenure	Owner-occupied
Transaction Type	New dwelling
Terrain Type	Urban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2021
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	18.20 m	41.35 m²	2.54 m
1st Storey:	18.20 m	41.35 m²	2.79 m

7.0 Living Area	17.49	m²
8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m²K

9.0 External Walls

Description	Type	U-Value (W/m²K)	Gross Area (m²)	Nett Area (m²)
External Wall	Cavity Wall	0.18	97.01	76.01

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Area (m²)
Party Wall	Filled Cavity with Edge Sealing		0.00	46.37

10.0 External Roofs

Description	Type	U-Value (W/m²K)	Gross Area (m²)	Nett Area (m²)
External Roof	External Plane Roof	0.15	41.35	41.35

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Area (m²)
Heat Loss Floor	Ground Floor - Solid		0.15	41.35

12.0 Opening Types

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

Design SAP
elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Main Door	Manufacturer	Solid Door							1.00
New Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front door	Solid Door	[1] External Wall	West							1.96	
Front elevation	Window	[1] External Wall	West	None	0.00					7.39	
Side elevation	Window	[1] External Wall	South	None	0.00					3.47	
Side ele	Window	[1] External Wall	North	None	0.00					8.18	

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

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	13.07	0.300	Yes
Table K1 - Approved	E3 Sill	12.14	0.040	Yes
Table K1 - Approved	E4 Jamb	36.32	0.050	Yes
Table K1 - Approved	E5 Ground floor (normal)	18.20	0.160	Yes
Table K1 - Approved	E6 Intermediate floor within a dwelling	18.20	0.070	Yes
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	18.20	0.060	No
Table K1 - Approved	E16 Corner (normal)	10.66	0.090	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.66	0.060	Yes
Table K1 - Default	P1 Party wall - Ground floor	8.70	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.70	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	8.70	0.240	No

Y-value	0.092	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP_{50}		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	Yes
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System	No	
22.0 Lighting		
Internal		
Total number of light fittings	10	
Total number of L.E.L. fittings	10	
Percentage of L.E.L. fittings	100.00	%
External		
External lights fitted	No	
23.0 Electricity Tariff	Standard	
24.0 Main Heating 1	Database	
Percentage of Heat	100	%
Database Ref. No.	104642	
Fuel Type	Electricity	
Main Heating	PET	
SAP Code	224	
In Winter	306.7	
In Summer	297.5	
Controls	CHD Time and temperature zone control	
PCDF Controls	0	
Sap Code	2207	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	<= 35°C	
25.0 Main Heating 2	None	
Community Heating	None	
28.0 Water Heating	HWP From main heating 1	
Water Heating	Main Heating 1	
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	Yes	
SAP Code	901	
Immersion Only Heating Hot Water	No	
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Foam	
Insulation Thickness	150 mm	

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

Design SAP
elmhurst energy

Cylinder Volume	210.00	L
Pipes insulation	Fully insulated primary pipework	

31.0 Thermal Store None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£52	B 89	
	Typical Cost	**Typical savings per year**	**Ratings after improvement SAP rating**	**Environmental Impact**
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£345	A 99	

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

Design SAP
elmhurst energy

Property Reference	Wyke Avenue	**Issued on Date**	13/05/2021
Assessment Reference	Plot 2	**Prop Type Ref**	
Property	Wyke Avenue		

SAP Rating	83 B	**DER**	19.38	**TER**	19.17
Environmental	85 B	**% DER<TER**	-1.08		
CO_2 Emissions (t/year)	1.35	**DFEE**	55.32	**TFEE**	57.89
General Requirements Compliance	Fail	**% DFEE<TFEE**	4.44		

Assessor Details	Mr. Nicky Bowen, Domestic Energy Solutions, Tel: 01455883250, nickybowen@sky.com	**Assessor ID**	D719-0001
Client			

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

Orientation	South
Property Tenure	Owner-occupied
Transaction Type	New dwelling
Terrain Type	Urban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2021
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	20.20 m	43.95 m^2	2.54 m
1st Storey:	18.20 m	41.35 m^2	2.79 m

7.0 Living Area	35.17	m^2
8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m^2K

9.0 External Walls

Description	Type	U-Value (W/m^2K)	Gross Area (m^2)	Nett Area (m^2)
External Wall	Cavity Wall	0.18	102.09	80.26

9.1 Party Walls

Description	Type	Construction	U-Value (W/m^2K)	Area (m^2)
Party Wall	Filled Cavity with Edge Sealing		0.00	46.37

10.0 External Roofs

Description	Type	U-Value (W/m^2K)	Gross Area (m^2)	Nett Area (m^2)
External Roof	External Plane Roof	0.15	43.95	43.95

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m^2K)	Area (m^2)
Heat Loss Floor	Ground Floor - Solid		0.15	43.95

12.0 Opening Types

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

Design SAP
elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Main Door	Manufacturer	Solid Door							1.00
New Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front door	Solid Door	[1] External Wall	South							1.96	
Front elevation	Window	[1] External Wall	South	None	0.00					6.18	
Side elevation	Window	[1] External Wall	East	None	0.00					4.29	
Rear ele	Window	[1] External Wall	North	None	0.00					9.40	

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

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	13.85	0.300	Yes
Table K1 - Approved	E3 Sill	12.92	0.040	Yes
Table K1 - Approved	E4 Jamb	33.28	0.050	Yes
Table K1 - Approved	E5 Ground floor (normal)	20.20	0.160	Yes
Table K1 - Approved	E6 Intermediate floor within a dwelling	18.20	0.070	Yes
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	20.20	0.060	No
Table K1 - Approved	E16 Corner (normal)	10.66	0.090	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.66	0.060	Yes
Table K1 - Default	P1 Party wall - Ground floor	8.70	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.70	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	8.70	0.240	No

Y-value	0.090	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP_{50}		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	Yes
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System	No	
22.0 Lighting		
Internal		
Total number of light fittings	10	
Total number of L.E.L. fittings	10	
Percentage of L.E.L. fittings	100.00	%
External		
External lights fitted	No	
23.0 Electricity Tariff	Standard	
24.0 Main Heating 1	Database	
Percentage of Heat	100	%
Database Ref. No.	17929	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.5	
In Summer	87.3	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	
25.0 Main Heating 2	None	
Community Heating	None	
28.0 Water Heating	HWP From main heating 1	
Water Heating	Main Heating 1	
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	Yes	
SAP Code	901	
29.0 Hot Water Cylinder	None	

Recommendations

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

Design SAP
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Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£28	B 84	

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£345	A 94	

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

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Property Reference	Wyke Avenue	**Issued on Date**	12/05/2021
Assessment Reference	Plot 2 ASHP	**Prop Type Ref**	
Property	Wyke Avenue		

SAP Rating	87 B	**DER**	14.85	**TER**	27.82
Environmental	88 B	**% DER<TER**	46.63		
CO_2 Emissions (t/year)	1.06	**DFEE**	55.32	**TFEE**	57.89
General Requirements Compliance	Pass	**% DFEE<TFEE**	4.44		

Assessor Details	Mr. Nicky Bowen, Domestic Energy Solutions, Tel: 01455883250, nickybowen@sky.com	**Assessor ID**	D719-0001
Client			

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

Orientation	South
Property Tenure	Owner-occupied
Transaction Type	New dwelling
Terrain Type	Urban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2021
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	20.20 m	43.95 m^2	2.54 m
1st Storey:	18.20 m	41.35 m^2	2.79 m

7.0 Living Area	35.17	m^2
8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m^2K

9.0 External Walls

Description	Type	U-Value (W/m^2K)	Gross Area (m^2)	Nett Area (m^2)
External Wall	Cavity Wall	0.18	102.09	80.26

9.1 Party Walls

Description	Type	Construction	U-Value (W/m^2K)	Area (m^2)
Party Wall	Filled Cavity with Edge Sealing		0.00	46.37

10.0 External Roofs

Description	Type	U-Value (W/m^2K)	Gross Area (m^2)	Nett Area (m^2)
External Roof	External Plane Roof	0.15	43.95	43.95

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m^2K)	Area (m^2)
Heat Loss Floor	Ground Floor - Solid		0.15	43.95

12.0 Opening Types

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

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Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Main Door	Manufacturer	Solid Door							1.00
New Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front door	Solid Door	[1] External Wall	South							1.96	
Front elevation	Window	[1] External Wall	South	None	0.00					6.18	
Side elevation	Window	[1] External Wall	East	None	0.00					4.29	
Rear ele	Window	[1] External Wall	North	None	0.00					9.40	

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

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	13.85	0.300	Yes
Table K1 - Approved	E3 Sill	12.92	0.040	Yes
Table K1 - Approved	E4 Jamb	33.28	0.050	Yes
Table K1 - Approved	E5 Ground floor (normal)	20.20	0.160	Yes
Table K1 - Approved	E6 Intermediate floor within a dwelling	18.20	0.070	Yes
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	20.20	0.060	No
Table K1 - Approved	E16 Corner (normal)	10.66	0.090	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.66	0.060	Yes
Table K1 - Default	P1 Party wall - Ground floor	8.70	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.70	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	8.70	0.240	No

Y-value	0.090	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP_{50}		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	Yes
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System	No	
22.0 Lighting		
Internal		
Total number of light fittings	10	
Total number of L.E.L. fittings	10	
Percentage of L.E.L. fittings	100.00	%
External		
External lights fitted	No	
23.0 Electricity Tariff	Standard	
24.0 Main Heating 1	Database	
Percentage of Heat	100	%
Database Ref. No.	104642	
Fuel Type	Electricity	
Main Heating	PET	
SAP Code	224	
In Winter	320.5	
In Summer	297.5	
Controls	CHD Time and temperature zone control	
PCDF Controls	0	
Sap Code	2207	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	<= 35°C	
25.0 Main Heating 2	None	
Community Heating	None	
28.0 Water Heating	HWP From main heating 1	
Water Heating	Main Heating 1	
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	Yes	
SAP Code	901	
Immersion Only Heating Hot Water	No	
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Foam	
Insulation Thickness	150 mm	

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

Design SAP
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Cylinder Volume	210.00	L
Pipes insulation	Fully insulated primary pipework	

31.0 Thermal Store None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£53	B 88	
	Typical Cost	**Typical savings per year**	**Ratings after improvement SAP rating**	**Environmental Impact**
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£345	A 99	

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

Design SAP
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Property Reference	Wyke Avenue	**Issued on Date**	13/05/2021
Assessment Reference	Plot 1	**Prop Type Ref**	
Property	Wyke Avenue		

SAP Rating	83 B	**DER**	19.06	**TER**	18.97
Environmental	85 B	**% DER<TER**	-0.46		
CO_2 Emissions (t/year)	1.29	**DFEE**	54.09	**TFEE**	56.77
General Requirements Compliance	Fail	**% DFEE<TFEE**	4.72		

Assessor Details	Mr. Nicky Bowen, Domestic Energy Solutions, Tel: 01455883250, nickybowen@sky.com	**Assessor ID**	D719-0001
Client			

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

Orientation	West
Property Tenure	Owner-occupied
Transaction Type	New dwelling
Terrain Type	Urban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2021
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	18.20 m	41.35 m²	2.54 m
1st Storey:	18.20 m	41.35 m²	2.79 m

7.0 Living Area	17.49	m²
8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m²K

9.0 External Walls

Description	Type	U-Value (W/m²K)	Gross Area (m²)	Nett Area (m²)
External Wall	Cavity Wall	0.18	97.01	76.01

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Area (m²)
Party Wall	Filled Cavity with Edge Sealing		0.00	46.37

10.0 External Roofs

Description	Type	U-Value (W/m²K)	Gross Area (m²)	Nett Area (m²)
External Roof	External Plane Roof	0.15	41.35	41.35

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Area (m²)
Heat Loss Floor	Ground Floor - Solid		0.15	41.35

12.0 Opening Types

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

Design SAP
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Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Main Door	Manufacturer	Solid Door							1.00
New Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front door	Solid Door	[1] External Wall	West							1.96	
Front elevation	Window	[1] External Wall	West	None	0.00					7.39	
Side elevation	Window	[1] External Wall	South	None	0.00					3.47	
Side ele	Window	[1] External Wall	North	None	0.00					8.18	

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

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	13.07	0.300	Yes
Table K1 - Approved	E3 Sill	12.14	0.040	Yes
Table K1 - Approved	E4 Jamb	36.32	0.050	Yes
Table K1 - Approved	E5 Ground floor (normal)	18.20	0.160	Yes
Table K1 - Approved	E6 Intermediate floor within a dwelling	18.20	0.070	Yes
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	18.20	0.060	No
Table K1 - Approved	E16 Corner (normal)	10.66	0.090	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.66	0.060	Yes
Table K1 - Default	P1 Party wall - Ground floor	8.70	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.70	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	8.70	0.240	No

Y-value	0.092	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP_{50}		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	Yes
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System	No	
22.0 Lighting		
Internal		
Total number of light fittings	10	
Total number of L.E.L. fittings	10	
Percentage of L.E.L. fittings	100.00	%
External		
External lights fitted	No	
23.0 Electricity Tariff	Standard	
24.0 Main Heating 1	Database	
Percentage of Heat	100	%
Database Ref. No.	17929	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.5	
In Summer	87.3	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	
25.0 Main Heating 2	None	
Community Heating	None	
28.0 Water Heating	HWP From main heating 1	
Water Heating	Main Heating 1	
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	Yes	
SAP Code	901	
29.0 Hot Water Cylinder	None	

Recommendations

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

Design SAP
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Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£28	B 84	

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£345	A 95	