

8.0 RESULTS

Using the input data outlined in the sections above and appendices the SAP calculations were performed, and the following results were produced:

8.0.1 Individual Apartment SAP Calculations

Apartment	Energy Consumption			Carbon Emissions				Cri 03
	TTEE kW/h/m ² /yr	DFEE kW/h/m ² /yr	% DFEE<TTEE	TER Kg CO ₂ /m ² /yr	DER Kg CO ₂ /m ² /yr	% DER<TER	DER tCO ₂ /yr	
Social house 01	64.30	57.81	11%	21.69	9.41	57%	0.53	PASS
Social house 02	54.62	51.86	5%	20.04	8.96	55%	0.48	PASS
Social house 03	54.62	51.86	5%	20.04	8.96	55%	0.48	PASS
Social house 04	64.30	57.81	11%	21.69	9.41	57%	0.53	PASS
G01	65.53	58.42	11%	21.25	8.93	58%	0.54	PASS
G02	61.84	57.79	7%	19.98	8.64	57%	0.57	PASS
G03	62.71	57.83	8%	21.53	9.13	58%	0.47	PASS
1st 01	52.52	50.55	4%	19.27	8.48	56%	0.46	PASS
1st 02	53.29	53.21	0%	19.81	8.75	56%	0.43	PASS
1st 03	50.70	50.49	0%	19.83	8.67	56%	0.39	PASS
1st 04	63.74	60.08	6%	25.48	9.63	62%	0.41	PASS
1st 05	59.34	59.18	0%	19.79	8.78	56%	0.55	PASS
2nd 01	52.52	50.55	4%	19.27	8.48	56%	0.46	PASS
2nd 02	52.21	52.05	1%	19.66	8.65	56%	0.42	PASS
2nd 03	49.10	48.75	1%	19.52	8.52	56%	0.39	PASS
2nd 04	61.72	58.74	5%	25.01	9.52	62%	0.40	PASS
2nd 05	59.34	59.18	0%	19.79	8.78	56%	0.55	PASS
3rd 01	52.52	50.55	4%	19.27	8.48	56%	0.46	PASS
3rd 02	52.21	52.05	1%	19.66	8.65	56%	0.42	PASS
3rd 03	49.10	48.75	1%	19.52	8.52	56%	0.39	PASS
3rd 04	61.72	58.74	5%	25.01	9.52	62%	0.40	PASS
3rd 05	59.34	59.18	0%	19.79	8.78	56%	0.55	PASS
4th 01	55.42	52.46	5%	19.84	8.65	56%	0.46	PASS
4th 02	53.29	53.21	0%	19.81	8.75	56%	0.43	PASS
4th 03	51.10	51.04	0%	19.91	8.72	56%	0.39	PASS
4th 04	68.70	63.35	8%	26.63	9.92	63%	0.42	PASS
4th 05	59.34	59.18	0%	19.79	8.78	56%	0.55	PASS
5th 01	60.65	56.04	8%	20.36	8.75	57%	0.51	PASS
5th 02	60.69	59.84	1%	20.23	8.91	56%	0.54	PASS
5th 03	69.40	67.71	2%	21.70	9.52	56%	0.59	PASS
6th 01	60.65	56.04	8%	20.36	8.75	57%	0.51	PASS
6th 02	60.69	59.84	1%	20.23	8.91	56%	0.54	PASS
6th 03	63.26	62.69	1%	20.50	9.07	56%	0.57	PASS
7th 01	60.65	56.04	8%	20.36	8.75	57%	0.51	PASS
7th 02	60.69	59.84	1%	20.23	8.91	56%	0.54	PASS
7th 03	60.35	60.18	0%	19.92	8.85	56%	0.55	PASS
8th 01	60.65	56.04	8%	20.36	8.75	57%	0.51	PASS
8th 02	60.69	59.84	1%	20.23	8.91	56%	0.54	PASS
8th 03	60.35	60.18	0%	19.92	8.85	56%	0.55	PASS
9th 01	64.50	57.86	10%	21.12	8.90	58%	0.52	PASS
9th 02	64.27	61.40	4%	20.94	9.03	56.9%	0.55	PASS
9th 03	68.84	66.25	4%	21.60	9.38	57%	0.59	PASS

Table 2: SAP results for each apartment

As the results above show, when using the input data outlined in this report, all dwellings will be compliant with the Building Regulations Part L1A 2013 and improve over the regulations by around 52% on average.

All apartments will also achieve the following:

- SAP ratings of 82 B or higher.
- Env ratings of 92 A or higher.
- A residential EPC band B.

Sample SAP outputs as proof of the approved calculation methods can be found in Appendix C.

Sample draft EPC's as proof of the approved calculation methods can be found in Appendix D.

8.0.1 Whole Building Calculations

Please note all apartments were calculated first using a conventional gas boiler then with the chosen CHP engine to highlight the savings made as required by local policy.

The results of the total site CO₂ emissions are shown below:



Table 3: Site-wide CO₂ emissions

The results show that when not using any renewables or de-centralised energy production the building will be compliant with building regulations.

The results also show that with the chosen CHP engine applied the building will achieve a 58% reduction in CO₂ emissions, significantly more than the 20% reduction required by local policy.

9.0 SUMMARY & CONCLUSIONS

Using the input data outlined in this report, the following conclusions can be found:

- All dwellings will be compliant with Criterion 01, the TER and TFEE, of the Building Regulations Part L1A 2013, without contribution from renewables or de-centralised energy production.
- All dwellings will have SAP ratings between 82-83, which is a very low energy consuming design.
- All dwellings will have Env ratings between 92-94, indicating they will produce very little CO₂.
- All dwellings will achieve residential EPC band B ratings.
- All dwellings will be compliant with Criterion 02, limits to design flexibility.
- All dwellings will be compliant with Criterion 03, limits to heat gains.
- With the CHP applied, the building will have a 58% reduction of CO₂ emissions over a conventional gas boiler system, significantly more than the 20% requirement by local policy.

10.0 APPENDICES

10.01 Appendix A – LZC Feasibility Study

Technology		Feasibility	
Photovoltaic (PV) Panels		PV's use semiconductor technology to convert incident solar radiation into electrical power. The building is relatively well suited for solar collection with a flat roof located many stories above ground level and the majority of plant located in the energy centre. Any electricity that is generated and used on site is preferable as every kWh used is one that the development doesn't have to purchase. Any surplus electricity generated can be exported to the national grid, receiving a further export tariff in addition to the generation tariff.	High
Solar Thermal Panels		Solar thermal panels are a method of harvesting the sun's energy, commonly to provide a source of preheated water. As mentioned above, the building has a flat roof providing an ideal location for solar thermal collection. The optimum size of a solar thermal array is to provide approximately a third of the daily stored demand, which would benefit the residential areas however it would be at the cost of PV panel area. Electricity demand reduction, from PV's, has a greater impact on CO2 savings than the gas demand used for hot water heating, especially when including CHP making this tech feasible but less effective than other options.	Medium
Ground Source Heat Pump (GSHP)		A GSHP takes low-grade heat from the ground and uses electricity to convert it to useful heat (at approximately 40°C) that can be used to heat a building. The ground can also be used as a heat sink to provide cooling. The bore holes and length of pipework into the ground required for this tech make this option difficult to justify considering the developments dense urban location.	Low
Air Source Heat Pump (ASHP)		Similar to the GSHP, ASHP utilises the external environment as a heat source. A heat pump uses electricity or gas to run a refrigerant cycle, extracting heat from external air to convert it to useful heat for space heating. ASHPs offer high efficiencies and are suited to institutional and commercial properties. These systems are typically noisy and require an area of flat roof, and may be subject to planning implications due to the visual impact and noise breakout. As ASHP outdoor units cannot be placed in internal energy centres, the roof space is better allocated with PV's and essential plant and the building is also not intended to be air-conditioned makes this not a feasible tech for this development.	Low
Wind Turbines		Wind energy can be converted to electricity by using wind turbines. This renewable technology is suited to exposed areas free from obstructions where the average wind speeds are high. On the site there are plenty of obstructions which would lead to the wind having a turbulent nature resulting in poor output for turbines, plus they have significant visual and noise impacts on neighbouring areas. Hence they are unsuitable for this development.	Low
Biomass		Biomass fuel is usually wood chips or wood pellets, and as it comes from plants it is considered a low-carbon source of high-grade heat that can be used for space heating, domestic hot water and, with absorption chillers, cooling (this last option is very rarely implemented due to high capital cost). A biomass boiler needs to operate under a reasonably constant load being a solid fuel boiler; it is unable to respond to load fluctuations as quickly as a gas or oil boiler. This limits the boilers to being suitable to operate for the provision of the base load. This could still be suitable for this development for its likely large base load however biomass also has the potential to have a significantly detrimental effect on air quality in the local vicinity, frequent fuel deliveries are required which could be disruptive to residents and there are significant maintenance costs. Unless a free source of wood can be found, such as waste from a factory or forestry management operation, the biomass fuel is often the same price or more expensive than gas. This means that the additional capital outlay on top of the increased fuel, maintenance costs, air quality, running costs and maintenance issues make biomass less viable than other tech available.	Low
Combined Heat and Power		CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process, the heat being distributed in surrounding buildings instead of being wasted. CHP is best suited to buildings with high heating and DHW demands and therefore would be ideal for this development.	High
District Heating		DH tends to be large CHP units run by commercial energy firms supplying energy to local buildings through underground pipework. Though they offer the same benefits as an on site CHP, without maintenance costs (provided by the supplier), the limitations are the proposed site needs to be within reasonable distance of a network. Although Reading Borough Council are establishing measures to start incorporating DH no proposals will be available for at least 10 years as a result DH is not an option and therefore not considered.	Low

10.03 Appendix C – Sample SAP Outputs

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Property Reference	Phase 2 New-Builds - CHP				Issued on Date	04/05/2018
Survey Reference	2nd 04	Prop Type Ref				
Property	59-75, Queens Road, READING, RG1 4BN					
SAP Rating	83 B	DER	9.52	TER	25.01	
Environmental	94 A	% DER<TER	61.93			
CO ₂ Emissions (t/year)	0.40	DFEE	58.74	TFEE	61.72	
General Requirements Compliance	Pass	% DFEE<TFEE	4.82			
Surveyor	Christopher Armstrong, Tel: 01795 841035				Surveyor ID	A457-0002
Client						

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas (c)		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	25.01	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.52	kgCO ₂ /m ²	Pass
	-15.49 (-61.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.72	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	58.74	kWh/m ² /yr	
	-3.0 (-4.9%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Openings	1.49 (max. 2.00)	2.00 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Community heating scheme	-
Secondary heating system	None	

5 Cylinder insulation

Hot water storage	No cylinder	
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6 Controls

Space heating controls	Flat rate charging, programmer and TRVs	Pass
Hot water controls	No cylinder	

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100	%	
Minimum	75	%	Pass

8 Mechanical ventilation

Continuous supply and extract system			
Specific fan power	0.40		
Maximum	1.5		Pass
MVHR efficiency	70	%	
Minimum	70	%	Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)	Slight	Pass
Based on:		
Overshading	Average	
Windows facing East	10.00 m², No overhang	
Windows facing South	2.68 m², No overhang	
Air change rate	5.00 ach	
Blinds/curtains	None	

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type	U-value		
Solid Wall	0.00	W/m²K	Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

10 Key features

Party wall U-value	0.00	W/m²K
Community CHP, Mains gas	N/A	

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Property Reference	Phase 2 New-Builds - CHP				Issued on Date	04/05/2018
Survey Reference	9th 03	Prop Type Ref				
Property	59-75, Queens Road, READING, RG1 4BN					
SAP Rating	83 B	DER	9.38	TER	21.60	
Environmental	93 A	% DER<TER	56.57			
CO ₂ Emissions (t/year)	0.59	DFEE	66.25	TFEE	68.84	
General Requirements Compliance	Pass	% DFEE<TFEE	3.76			
Surveyor	Christopher Armstrong, Tel: 01795 841035				Surveyor ID	A457-0002
Client						

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas (c)		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	21.60	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.38	kgCO ₂ /m ²	Pass
	-12.22 (-56.6%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	68.84	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	66.25	kWh/m ² /yr	
	-2.6 (-3.8%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.45 (max. 2.00)	2.00 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Community heating scheme	-
Secondary heating system	None	

5 Cylinder insulation

Hot water storage	No cylinder	
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6 Controls

Space heating controls	Flat rate charging, programmer and TRVs	Pass
Hot water controls	No cylinder	

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100	%	
Minimum	75	%	Pass

8 Mechanical ventilation

Continuous supply and extract system			
Specific fan power	0.40		
Maximum	1.5		Pass
MVHR efficiency	70	%	
Minimum	70	%	Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)	Slight	Pass
Based on:		
Overshading	Average	
Windows facing East	12.80 m<sup>2</sup>, No overhang	
Windows facing West	13.06 m<sup>2</sup>, No overhang	
Air change rate	5.00 ach	
Blinds/curtains	None	

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

10 Key features

Roof U-value	0.10	W/m ² K
Community CHP, Mains gas	N/A	

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Property Reference	Social Housing - CHP	Issued on Date	03/05/2018
Survey Reference	Social home 01	Prop Type Ref	
Property	59-75, Queens Road, READING, RG1 4BN		
SAP Rating	83 B	DER	9.41
Environmental	93 A	TER	21.69
CO ₂ Emissions (t/year)	0.53	% DER<TER	56.62
General Requirements Compliance	Pass	DFEE	57.81
		TFEE	64.30
		% DFEE<TFEE	10.09
Surveyor	Christopher Armstrong, Tel: 01795 841035	Surveyor ID	A457-0002
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas (c)		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	21.69	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.41	kgCO ₂ /m ²	Pass
	-12.28 (-56.6%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	64.30	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	57.81	kWh/m ² /yr	
	-6.5 (-10.1%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.85 (max. 2.00)	2.00 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Community heating scheme	-
Secondary heating system	None	

5 Cylinder insulation

Hot water storage	No cylinder	
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6 Controls

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Space heating controls

Flat rate charging, programmer and TRVs

Pass

Hot water controls

No cylinder

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power

0.40

Maximum

1.5

Pass

MVHR efficiency

70

%

Minimum

70

%

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

6.93 m², No overhang

Air change rate

5.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Solid Wall

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.10

W/m²K

Floor U-value

0.10

W/m²K

Community CHP, Mains gas

N/A

10.04 Appendix D – Draft EPC's

Energy Performance Certificate

PREVIEW
NOT FOR ISSUE HM Government

Jelf Group Ltd, 59-75 Queens Road, READING, RG1 4BN

Dwelling type: Mid-floor flat
Date of assessment: 10 May 2018
Date of certificate: 10 May 2018

Reference number: 0000-0000-0000-0000-0000
Type of assessment: SAP, new dwelling
Total floor area: 50 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient

Estimated energy costs of dwelling for 3 years:

£ 753

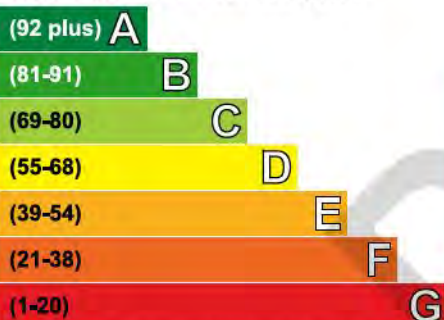
Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£ 111 over 3 years	£ 111 over 3 years	Not applicable
Heating	£ 429 over 3 years	£ 429 over 3 years	
Hot Water	£ 213 over 3 years	£ 213 over 3 years	
Totals	£ 753	£ 753	

These figures show how much the average household would spend in this property for heating, lighting and hot water and is not based on energy used by individual households. This excludes energy use for running appliances like TVs, computers and cookers, and electricity generated by microgeneration.

Energy Efficiency Rating

Very energy efficient - lower running costs



Not energy efficient - higher running costs

Current	Potential
83	83

The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

The EPC rating shown here is based on standard assumptions about occupancy and energy use and may not reflect how energy is consumed by individual occupants.

Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Average thermal transmittance 0.14 W/m ² K	★★★★★
Roof	(other premises above)	—
Floor	(other premises below)	—
Windows	High performance glazing	★★★★★
Main heating	Community scheme	★★★★★
Main heating controls	Flat rate charging, programmer and TRVs	★★★☆☆☆
Secondary heating	None	—
Hot water	Community scheme	★★★★★
Lighting	Low energy lighting in all fixed outlets	★★★★★
Air tightness	Air permeability 5.0 m ³ /h.m ² (assumed)	★★★★☆☆

Thermal transmittance is a measure of the rate of heat loss through a building element; the lower the value the better the energy performance.

Air permeability is a measure of the air tightness of a building; the lower the value the better the air tightness.

Current primary energy use per square metre of floor area: 41 kWh/m² per year

Low and zero carbon energy sources

Low and zero carbon energy sources are sources of energy that release either very little or no carbon dioxide into the atmosphere when they are used. Installing these sources may help reduce energy bills as well as cutting carbon. The following low or zero carbon energy sources are provided for this home:

- Combined heat and power

Your home's heat demand

This table shows the energy used for space and water heating by an average household in this property.

Heat demand

Space heating (kWh per year)	1,482
Water heating (kWh per year)	1,878

If you built your own home and, as part of its construction, you installed a renewable heating system, you could receive Renewable Heat Incentive (RHI) payments. The estimated energy required for space and water heating will form the basis of the payments. For more information, search for the domestic RHI on the www.gov.uk website.

Recommendations

None.

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 Elmhurst Energy Systems Ltd. You can obtain contact details of the Accreditation Scheme at www.elmhurstenergy.co.uk.

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.epcregister.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. Any personal data it contains will be processed in accordance with the General Data Protection Regulation and all applicable laws and regulations relating to the processing of personal data and privacy. For further information about this and how data about the property are used, please visit www.epcregister.com. To opt out of having information about your building made publicly available, please visit www.epcregister.com/optout.

Assessor's accreditation number: EES/021936
Assessor's name: Christopher Armstrong
Phone number: 01795 841035
E-mail address: carmstrong@quinnross.com
Related party disclosure: No related party

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

About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions.

The average household causes about 6 tonnes of carbon dioxide every year. Based on this assessment, your home currently produces approximately 0.4 tonnes of carbon dioxide every year. You could reduce emissions by switching to renewable energy sources.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions based on standardised assumptions about occupancy and energy use. The higher the rating the less impact it has on the environment.



Energy Performance Certificate

PREVIEW
NOT FOR ISSUE HM Government

Jelf Group Ltd, 59-75 Queens Road, READING, RG1 4BN

Dwelling type: Mid-floor flat
Date of assessment: 10 May 2018
Date of certificate: 10 May 2018

Reference number: 0000-0000-0000-0000-0000
Type of assessment: SAP, new dwelling
Total floor area: 74 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient

Estimated energy costs of dwelling for 3 years:

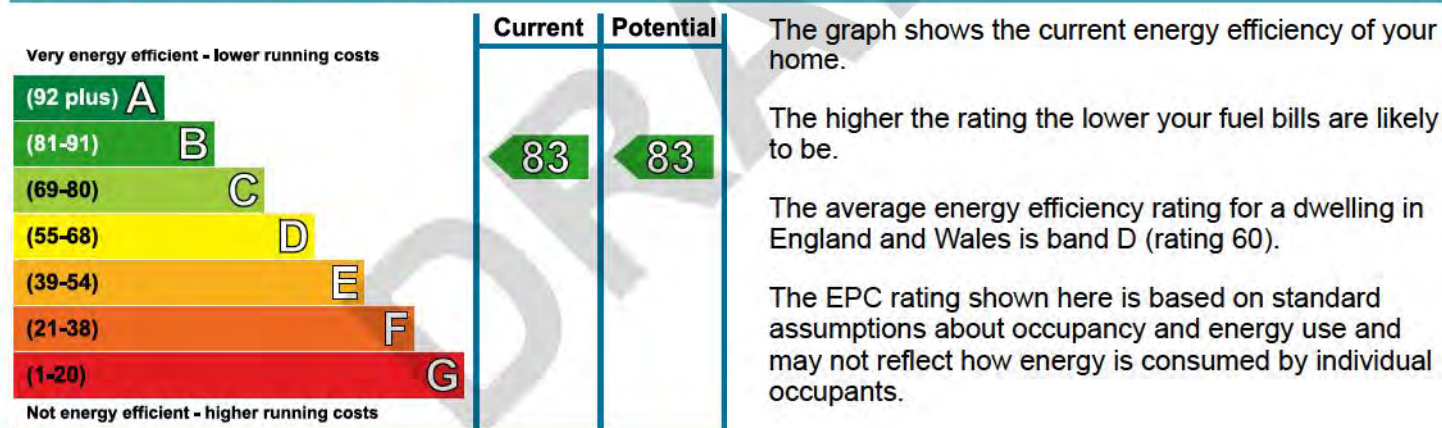
£ 981

Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£ 156 over 3 years	£ 156 over 3 years	Not applicable
Heating	£ 582 over 3 years	£ 582 over 3 years	
Hot Water	£ 243 over 3 years	£ 243 over 3 years	
Totals	£ 981	£ 981	

These figures show how much the average household would spend in this property for heating, lighting and hot water and is not based on energy used by individual households. This excludes energy use for running appliances like TVs, computers and cookers, and electricity generated by microgeneration.

Energy Efficiency Rating



Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Average thermal transmittance 0.14 W/m ² K	★★★★★
Roof	Average thermal transmittance 0.10 W/m ² K	★★★★★
Floor	(other premises below)	—
Windows	High performance glazing	★★★★★
Main heating	Community scheme	★★★★★
Main heating controls	Flat rate charging, programmer and TRVs	★★★☆☆☆
Secondary heating	None	—
Hot water	Community scheme	★★★★★
Lighting	Low energy lighting in all fixed outlets	★★★★★
Air tightness	Air permeability 5.0 m ³ /h.m ² (assumed)	★★★★☆☆

Thermal transmittance is a measure of the rate of heat loss through a building element; the lower the value the better the energy performance.

Air permeability is a measure of the air tightness of a building; the lower the value the better the air tightness.

Current primary energy use per square metre of floor area: 40 kWh/m² per year

Low and zero carbon energy sources

Low and zero carbon energy sources are sources of energy that release either very little or no carbon dioxide into the atmosphere when they are used. Installing these sources may help reduce energy bills as well as cutting carbon. The following low or zero carbon energy sources are provided for this home:

- Combined heat and power

Your home's heat demand

This table shows the energy used for space and water heating by an average household in this property.

Heat demand

Space heating (kWh per year)	2,832
Water heating (kWh per year)	2,137

If you built your own home and, as part of its construction, you installed a renewable heating system, you could receive Renewable Heat Incentive (RHI) payments. The estimated energy required for space and water heating will form the basis of the payments. For more information, search for the domestic RHI on the www.gov.uk website.

Recommendations

None.

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 Elmhurst Energy Systems Ltd. You can obtain contact details of the Accreditation Scheme at www.elmhurstenergy.co.uk.

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.epcregister.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. Any personal data it contains will be processed in accordance with the General Data Protection Regulation and all applicable laws and regulations relating to the processing of personal data and privacy. For further information about this and how data about the property are used, please visit www.epcregister.com. To opt out of having information about your building made publicly available, please visit www.epcregister.com/optout.

Assessor's accreditation number: EES/021936
Assessor's name: Christopher Armstrong
Phone number: 01795 841035
E-mail address: carmstrong@quinnross.com
Related party disclosure: No related party

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

About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions.

The average household causes about 6 tonnes of carbon dioxide every year. Based on this assessment, your home currently produces approximately 0.6 tonnes of carbon dioxide every year. You could reduce emissions by switching to renewable energy sources.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions based on standardised assumptions about occupancy and energy use. The higher the rating the less impact it has on the environment.



Energy Performance Certificate

PREVIEW
NOT FOR ISSUE HM Government

Jelf Group Ltd, 59-75 Queens Road, READING, RG1 4BN

Dwelling type:	End-terrace house	Reference number:	0000-0000-0000-0000-0000
Date of assessment:	10 May 2018	Type of assessment:	SAP, new dwelling
Date of certificate:	10 May 2018	Total floor area:	67 m ²

Use this document to:

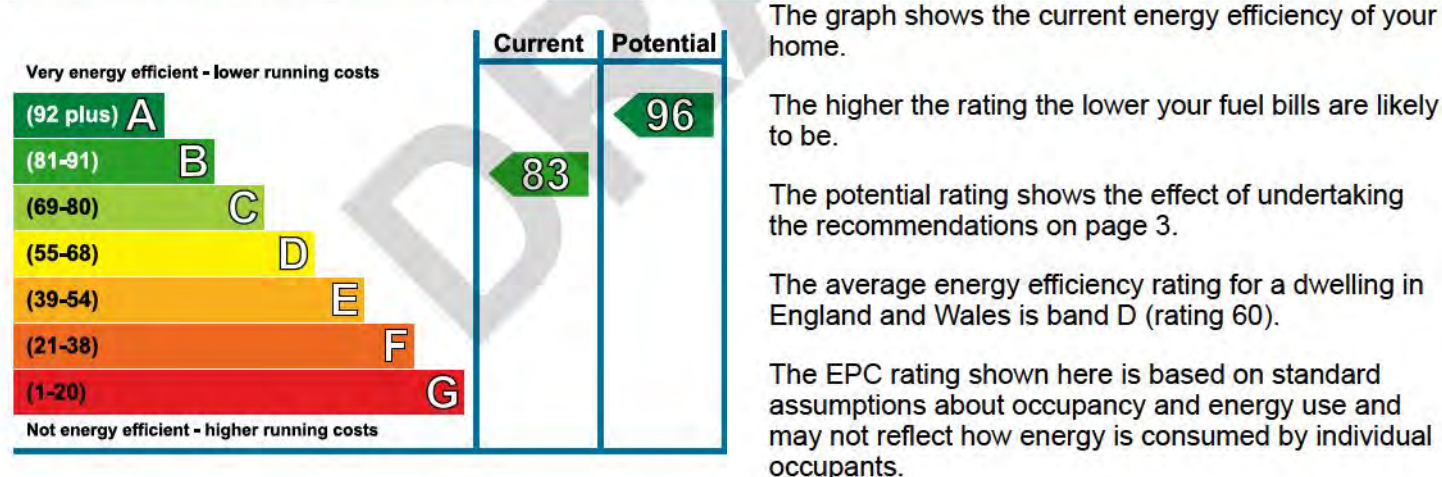
- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

Estimated energy costs of dwelling for 3 years:	£ 897
Over 3 years you could save	£ 72

Estimated energy costs of this home			
	Current costs	Potential costs	Potential future savings
Lighting	£ 165 over 3 years	£ 165 over 3 years	
Heating	£ 498 over 3 years	£ 498 over 3 years	
Hot Water	£ 234 over 3 years	£ 162 over 3 years	
Totals	£ 897	£ 825	

These figures show how much the average household would spend in this property for heating, lighting and hot water and is not based on energy used by individual households. This excludes energy use for running appliances like TVs, computers and cookers, and electricity generated by microgeneration.

Energy Efficiency Rating



Actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years
1 Solar water heating	£4,000 - £6,000	£ 72
2 Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£ 906

Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Average thermal transmittance 0.15 W/m ² K	★★★★★
Roof	Average thermal transmittance 0.10 W/m ² K	★★★★★
Floor	Average thermal transmittance 0.10 W/m ² K	★★★★★
Windows	Fully double glazed	★★★★☆
Main heating	Community scheme	★★★★★
Main heating controls	Flat rate charging, programmer and TRVs	★★★★☆☆
Secondary heating	None	—
Hot water	Community scheme	★★★★★
Lighting	Low energy lighting in all fixed outlets	★★★★★
Air tightness	Air permeability 5.0 m ³ /h.m ² (assumed)	★★★★☆

Thermal transmittance is a measure of the rate of heat loss through a building element; the lower the value the better the energy performance.

Air permeability is a measure of the air tightness of a building; the lower the value the better the air tightness.

Current primary energy use per square metre of floor area: 41 kWh/m² per year

Low and zero carbon energy sources

Low and zero carbon energy sources are sources of energy that release either very little or no carbon dioxide into the atmosphere when they are used. Installing these sources may help reduce energy bills as well as cutting carbon. The following low or zero carbon energy sources are provided for this home:

- Combined heat and power

Your home's heat demand

This table shows the energy used for space and water heating by an average household in this property.

Heat demand

Space heating (kWh per year)	2,101
Water heating (kWh per year)	2,067

If you built your own home and, as part of its construction, you installed a renewable heating system, you could receive Renewable Heat Incentive (RHI) payments. The estimated energy required for space and water heating will form the basis of the payments. For more information, search for the domestic RHI on the www.gov.uk website.

Recommendations

The measures below will improve the energy performance of your dwelling. The performance ratings after improvements listed below are cumulative; that is, they assume the improvements have been installed in the order that they appear in the table. Further information about the recommended measures and other simple actions you could take today to save money is available at www.gov.uk/energy-grants-calculator. Before installing measures, you should make sure you have secured the appropriate permissions, where necessary. Such permissions might include permission from your landlord (if you are a tenant) or approval under Building Regulations for certain types of work.

Recommended measures	Indicative cost	Typical savings per year	Rating after improvement
Solar water heating	£4,000 - £6,000	£ 24	 B84
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£ 302	 A96

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About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions.

The average household causes about 6 tonnes of carbon dioxide every year. Based on this assessment, your home currently produces approximately 0.5 tonnes of carbon dioxide every year. Adopting the recommendations in this report can reduce emissions and protect the environment. If you were to install these recommendations you could reduce this amount by 1.0 tonnes per year. You could reduce emissions even more by switching to renewable energy sources.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions based on standardised assumptions about occupancy and energy use. The higher the rating the less impact it has on the environment.

Current rating 93

