10 June 2026

Heat Loss Report & System Design

Prepared for

Spelthorne

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Prepared by

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Sureserve

Summary

Your property's heat loss

Floor area	Total heat loss	Average heat load
98 m^2	**7.16** kW	**73** W/m^2

Proposed system design



HEAT PUMP

Ideal Logic Air 8kW

Capacity at 50°C flow temp and -1.7 °C outdoor air temperature	8.02 kW
SCOP at 50°C	3.96



CYLINDER

Ideal Logic Air Pre-Plumbed Slimline 1Zone 180L

Capacity	180 litres



EMITTERS

11 new radiators

8 replaced, 3 additional, 1 retained

Performance comparison

Annual CO2 savings	Estimated annual running cost savings
2.2 tonnes	**£4,043** to **£4,282** per year

Heat loss report

This section presents the results of our detailed heat loss calculations for your property. The overall heat loss determines how big your heating system needs to be, and the room-by-room breakdown allows us to size the emitters (radiators and underfloor heating) correctly to keep each room warm on a cold day.

Introduction

How quickly your property loses heat depends on how big it is, the materials it is made from, and how air tight it is. Our detailed heat loss survey captured all this information and we have laid it out in this report so you can understand how and why we produce our recommendations. There are several key questions that we're looking to answer as we go through this process for you:

Are the heat pump and radiators big enough?

To keep your property warm, the heat pump needs to deliver heat to the emitters (by which we just mean radiators and underfloor heating) as quickly as your property loses it, and in turn the emitters need to deliver that heat as quickly as each room loses it.

We cannot rely on the fact that your existing radiators keep your property warm with your existing heating system, because heat pumps typically work at a much lower flow temperature than fossil-fuel boilers.

Whilst heat pumps are capable of making very hot water, they work most efficiently when generating low-temperature heat, typically between 35-50C. Gas boilers have traditionally been set up to generate high-temperature heat, with water temperatures of 70-80C (although they also work more efficiently at lower temperatures!).

A lower flow temperature, while more efficient, does mean the heat output from each radiator will be reduced. We use the heat loss survey to calculate how that reduced output compares to the room's demand for heat and then determine which (if any) radiators need replacing. In this way we ensure your new system will run efficiently with a low flow temperature, while still keeping you warm on cold days.

Is the heat pump too big?

This strikes many as a funny question, but we do not want to "oversize" your heat pump. While we design your heating system to ensure it keeps your property warm on cold days, most of the time it isn't that cold! On milder days, your house loses heat more slowly so the heat pump will need to provide less heat.

Heat pumps have to be sized quite precisely, as opposed to the majority of gas or oil boilers which are typically far more powerful than is actually needed for the property. If heat pumps turn on and off all the time, it can be really inefficient and unnecessarily increase energy bills. So we want to choose a model that can keep your property warm on a cold day, but "modulate down" to keep running efficiently on milder days.

We hope this all makes sense! Please do give the report a thorough read through and let us know if you have any questions – we're more than happy to explain what bits mean in more detail if you would like!

HEAT LOSS

Calculation conditions

When calculating the property's heat loss we design to certain conditions. This section shows the conditions used for this property.

Indoor & outdoor

Design outdoor air temperature -1.7 °C

The "99th percentile" temperature for the area — the outdoor temperature only falls below this 1% of the time.

Indoor temperature 18 °C to 22 °C

The set point the system needs to maintain. The value used in each room is shown in the room by room section.

Design ground temperature 11.3 °C

Average ground temperature across the year, used to calculate heat loss through floors.

All calculations have been done in compliance with BS EN12831 (UK National Annex) and comply with the standards laid out in the Microgeneration Certification Scheme.

HEAT LOSS

Heat loss by element

This section shows the heat loss through each element in the property. They give you a sense of which parts of the property fabric lose the most heat, and may indicate areas where insulating could have a significant impact on the heat loss.

Total heat loss 7.16 kW



Ground Floor · Roof · External Wall · Internal Wall · Window · Door · Ventilation

	U-VALUE* (W/m²K)	AREA	HEAT LOSS
Ground Floor • Suspended floor. No insulation.	0.59 — 1.20	57.9 m²	1,136 W
Intermediate Floor/Ceiling • Intermediate floor. no insulation.	1.41 — 1.73	98.2 m²	0 W
Roof • Pitched, 150mm insulation at joists, felted	0.23	40.3 m²	189 W
External Wall • Filled Cavity. Brick and Standard Block (100mm). Plaster	0.45	132.8 m²	1,223 W
Internal Wall • Block - 100mm standard aerated block, plaster. 126mm.	1.06	143.8 m²	356 W
Window • Double Glazed, Wood/PVC frame	2.80	19.9 m²	1,148 W
Door • Wooden door. 50% double glazing.	2.80	8.4 m²	509 W

	ACH**	VOLUME	HEAT LOSS
Ventilation	1.0 — 3.0	239 m³	2,602 W
Total			7.16 kW

*** U-Value:** the thermal conductivity of the element.

****ACH:** air changes per hour

HEAT LOSS

Heat loss by room

This section shows the heat loss from each room in the property. These results are used to design the emitters (i.e. radiators or underfloor) for the new system.

Total heat loss

7.16 kW



Bath/Shower · Bedroom 1 · Bedroom 2 · Hall/Landing · Kitchen · Living/Lounge · Bath/Shower · Bedroom 3 · Bedroom 4 · Hall/Landing

	ROOM TEMP	ACH*	FLOOR AREA	VOLUME	HEAT LOSS	HEAT LOSS PER UNIT AREA
Bath/Shower	22 °C	3.0	5.0 m²	12 m³	529 W	106 W/m²
Bedroom 1	18 °C	1.0	8.2 m²	20 m³	594 W	72 W/m²
Bedroom 2	18 °C	1.0	12.9 m²	31 m³	898 W	70 W/m²
Hall/Landing	18 °C	2.0	4.7 m²	12 m³	271 W	57 W/m²
Kitchen	18 °C	2.0	12.0 m²	29 m³	908 W	76 W/m²
Living/Lounge	21 °C	1.5	15.1 m²	37 m³	1,382 W	91 W/m²
Bath/Shower	22 °C	3.0	6.9 m²	17 m³	878 W	128 W/m²
Bedroom 3	18 °C	1.0	14.9 m²	35 m³	668 W	45 W/m²
Bedroom 4	18 °C	1.0	12.9 m²	33 m³	635 W	49 W/m²
Hall/Landing	18 °C	2.0	5.6 m²	14 m³	400 W	71 W/m²

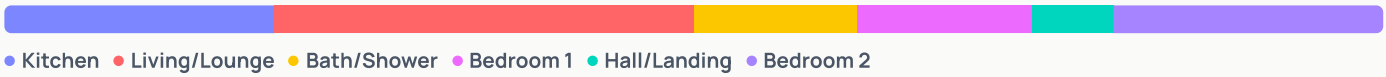
***ACH:** air changes per hour

HEAT LOSS BY FLOOR

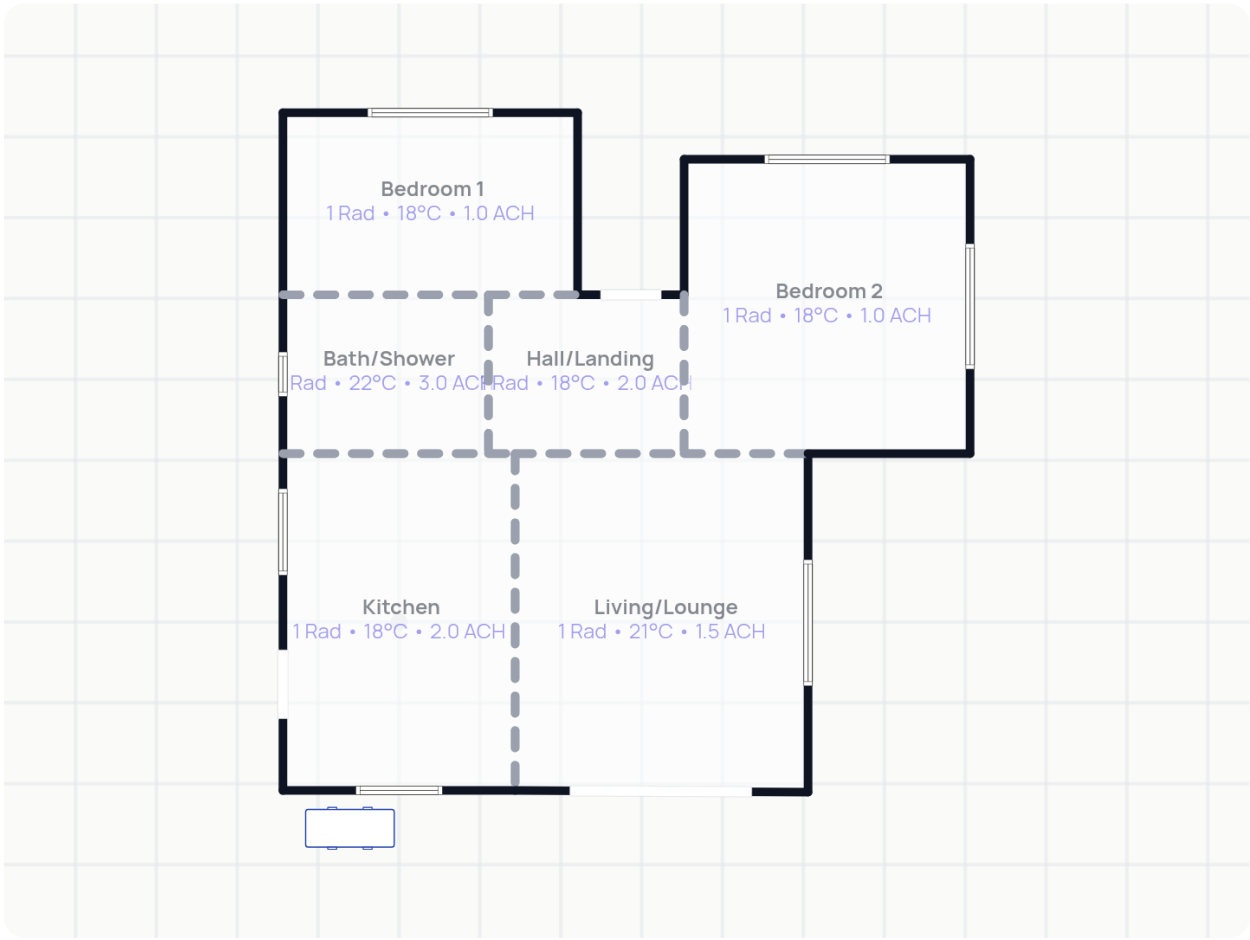
Ground floor

Heat loss by room

4582 W



Kitchen Living/Lounge Bath/Shower Bedroom 1 Hall/Landing Bedroom 2



Rads: number of radiators

UFH: underfloor heating in room

°C: room temperature

ACH: air changes per hour

W: number of windows

D: number of doors

HEAT LOSS BY ROOM

Bath/Shower

Total heat loss	Room temp	Air changes per hour
529 W	22 °C	3.0

Floor area	Average height	Volume
5.0 m²	2.4 m	12.2 m³



Heat loss by element

529 W



Ground Floor · External Walls · Internal Walls · Windows · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Ground Floor	-1.7 °C	0.74 W/m²K	5.0 m²	87 W
Intermediate Ceiling	22.0 °C	1.73 W/m²K	5.0 m²	0 W
External Walls	-1.7 °C	0.45 W/m²K	4.2 m²	45 W
Internal Walls	18.0 °C	1.06 W/m²K	17.2 m²	73 W
Windows	-1.7 °C	2.80 W/m²K	0.5 m²	35 W
Ventilation	-1.7 °C			288 W

Heat loss per m² 106 W/m²

Emitter performance

207 W (39%) of 529 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 500 mm	207 W	39 %

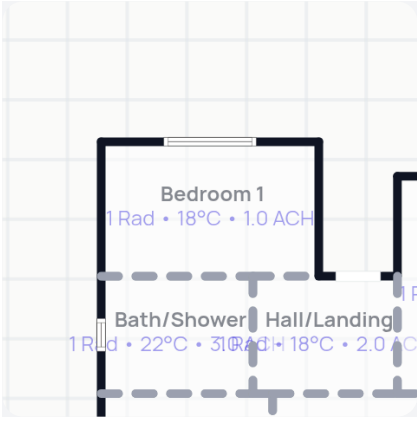
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Bedroom 1

Total heat loss	Room temp	Air changes per hour
594 W	18 °C	1.0

Floor area	Average height	Volume
8.2 m²	2.4 m	20.0 m³



Heat loss by element

594 W

Ground Floor · External Walls · Windows · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Ground Floor	-1.7 °C	1.20 W/m²K	8.2 m²	194 W
Intermediate Ceiling	18.0 °C	1.73 W/m²K	8.2 m²	0 W
External Walls	-1.7 °C	0.45 W/m²K	17.3 m²	153 W
Internal Walls 1	22.0 °C	1.06 W/m²K	6.2 m²	-26 W
Internal Walls 2	18.0 °C	1.06 W/m²K	2.7 m²	0 W
Windows	-1.7 °C	2.80 W/m²K	2.6 m²	141 W
Ventilation	-1.7 °C			131 W

Heat loss per m² — 72 W/m²

Emitter performance

502 W (85%) of 594 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 1000 mm	502 W	85 %

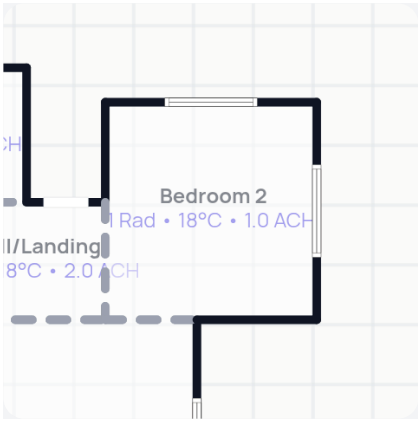
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Bedroom 2

Total heat loss	Room temp	Air changes per hour
898 W	18 °C	1.0

Floor area	Average height	Volume
12.9 m²	2.4 m	31.4 m³



Heat loss by element

898 W



Ground Floor · External Walls · Windows · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Ground Floor	-1.7 °C	1.12 W/m²K	12.9 m²	283 W
Intermediate Ceiling	18.0 °C	1.73 W/m²K	12.9 m²	0 W
External Walls	-1.7 °C	0.45 W/m²K	22.4 m²	199 W
Internal Walls 1	18.0 °C	1.06 W/m²K	4.8 m²	0 W
Internal Walls 2	21.0 °C	1.06 W/m²K	3.7 m²	-12 W
Windows	-1.7 °C	2.80 W/m²K	4.0 m²	222 W
Ventilation	-1.7 °C			206 W

Heat loss per m² — 70 W/m²

Emitter performance

913 W (102%) of 898 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 22 (K2) 450 x 1400 mm	913 W	102 %

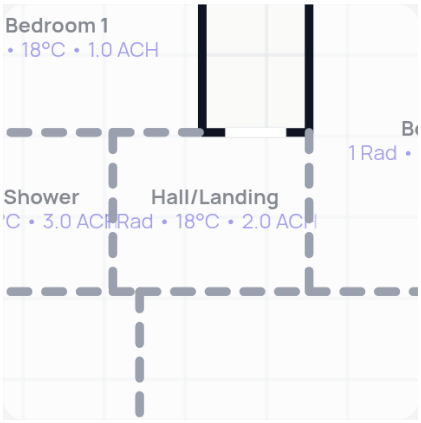
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Hall/Landing

Total heat loss	Room temp	Air changes per hour
271 W	18 °C	2.0

Floor area	Average height	Volume
4.7 m²	2.4 m	11.5 m³



Heat loss by element

271 W

Ground Floor · External Walls · External doors · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Ground Floor	-1.7 °C	0.59 W/m²K	4.7 m²	56 W
Intermediate Ceiling	18.0 °C	1.73 W/m²K	4.7 m²	0 W
External Walls	-1.7 °C	0.45 W/m²K	1.7 m²	15 W
Internal Walls 1	22.0 °C	1.06 W/m²K	4.8 m²	-20 W
Internal Walls 2	18.0 °C	1.06 W/m²K	8.3 m²	0 W
Internal Walls 3	21.0 °C	1.06 W/m²K	5.1 m²	-16 W
External doors	-1.7 °C	2.80 W/m²K	1.5 m²	84 W
Ventilation	-1.7 °C			152 W

Heat loss per m² — 57 W/m²

Emitter performance

251 W (93%) of 271 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 500 mm	251 W	93 %

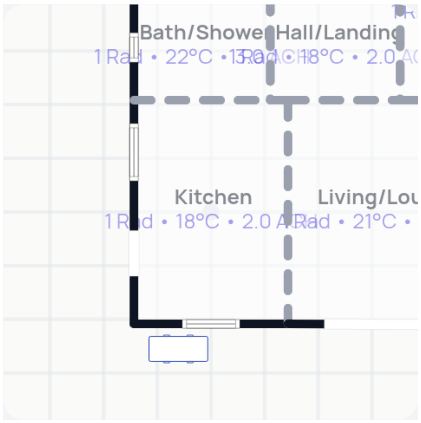
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Kitchen

Total heat loss	Room temp	Air changes per hour
908 W	18 °C	2.0

Floor area	Average height	Volume
12.0 m²	2.4 m	29.2 m³



Heat loss by element

908 W

Ground Floor · External Walls · Windows · External doors · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Ground Floor	-1.7 °C	0.93 W/m²K	12.0 m²	219 W
Intermediate Ceiling	18.0 °C	1.73 W/m²K	12.0 m²	0 W
External Walls	-1.7 °C	0.45 W/m²K	12.6 m²	111 W
Internal Walls 1	21.0 °C	1.06 W/m²K	10.2 m²	-32 W
Internal Walls 2	18.0 °C	1.06 W/m²K	0.8 m²	0 W
Internal Walls 3	22.0 °C	1.06 W/m²K	6.2 m²	-26 W
Windows	-1.7 °C	2.80 W/m²K	2.8 m²	156 W
External doors	-1.7 °C	2.80 W/m²K	1.8 m²	97 W
Ventilation	-1.7 °C			383 W

Heat loss per m² — 76 W/m²

Emitter performance

553 W (61%) of 908 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 1100 mm	553 W	61 %

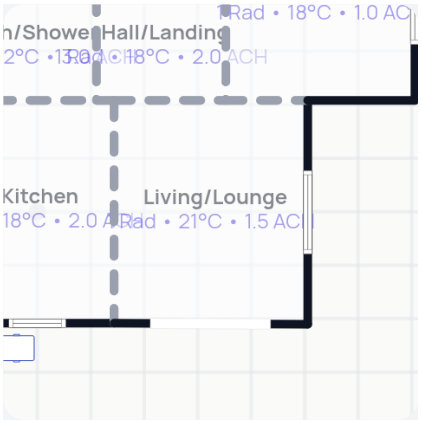
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Living/Lounge

Total heat loss	Room temp	Air changes per hour
1382 W	21 °C	1.5

Floor area	Average height	Volume
15.1 m²	2.4 m	36.8 m³



Heat loss by element

1,382 W

Ground Floor · External Walls · Internal Walls · Windows · External doors · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Ground Floor	-1.7 °C	0.86 W/m²K	15.1 m²	297 W
Intermediate Ceiling	21.0 °C	1.73 W/m²K	15.1 m²	0 W
External Walls	-1.7 °C	0.45 W/m²K	11.3 m²	116 W
Internal Walls	18.0 °C	1.06 W/m²K	19.0 m²	60 W
Windows	-1.7 °C	2.80 W/m²K	2.6 m²	164 W
External doors	-1.7 °C	2.80 W/m²K	5.2 m²	327 W
Ventilation	-1.7 °C			418 W

Heat loss per m² — 91 W/m²

Emitter performance

522 W (38%) of 1382 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 1200 mm	522 W	38 %

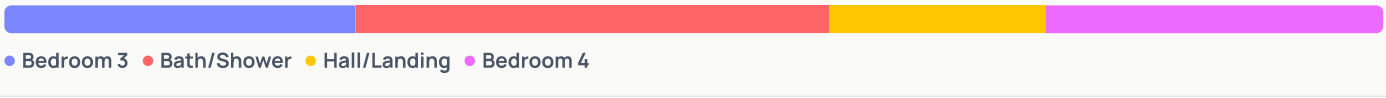
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY FLOOR

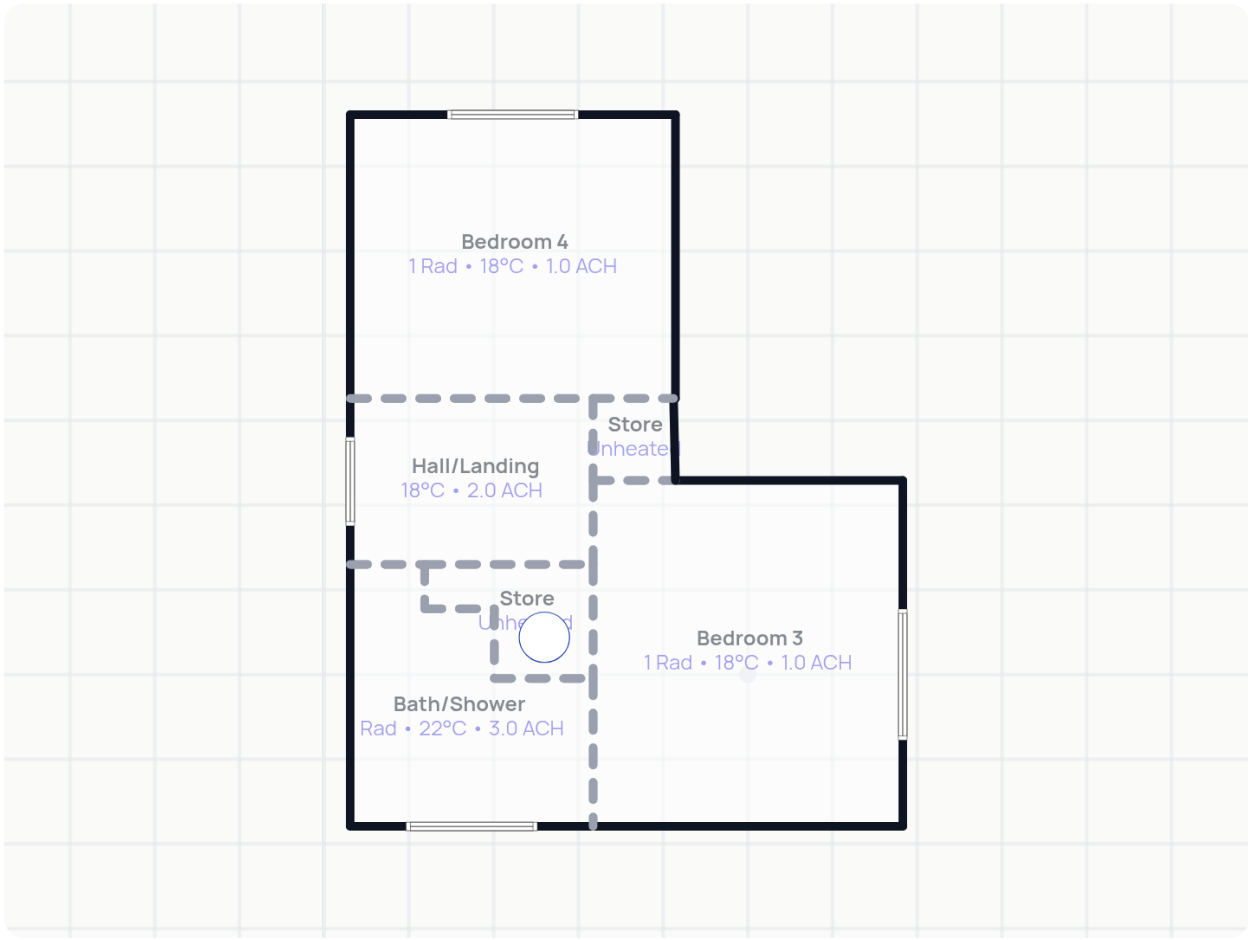
First floor

Heat loss by room

2581 W



Bedroom 3 Bath/Shower Hall/Landing Bedroom 4



Rads: number of radiators

UFH: underfloor heating in room

°C: room temperature

ACH: air changes per hour

W: number of windows

D: number of doors

HEAT LOSS BY ROOM

Bath/Shower

Total heat loss	Room temp	Air changes per hour
878 W	22 °C	3.0

Floor area	Average height	Volume
6.9 m²	2.4 m	16.9 m³



Heat loss by element

878 W

Roof · External Walls · Internal Walls · Windows · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Intermediate Floor	22.0 °C	1.41 W/m²K	6.9 m²	0 W
Roof	-1.7 °C	0.23 W/m²K	6.9 m²	37 W
External Walls	-1.7 °C	0.45 W/m²K	12.6 m²	134 W
Internal Walls 1	18.0 °C	1.06 W/m²K	6.4 m²	27 W
Internal Walls 2	5.0 °C	1.06 W/m²K	8.2 m²	147 W
Windows	-1.7 °C	2.80 W/m²K	2.0 m²	134 W
Ventilation	-1.7 °C			399 W

Heat loss per m² — 128 W/m²

Emitter performance

207 W (24%) of 878 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 500 mm	207 W	24 %

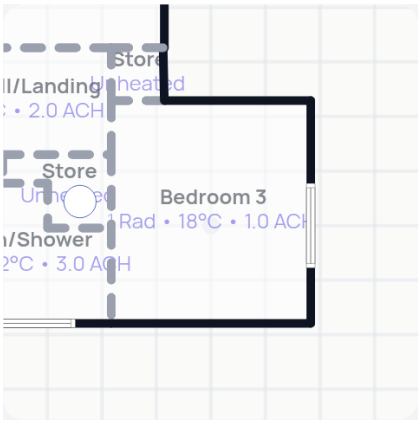
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Bedroom 3

Total heat loss	Room temp	Air changes per hour
668 W	18 °C	1.0

Floor area	Average height	Volume
14.9 m²	2.4 m	35.2 m³



Heat loss by element

668 W



Roof · External Walls · Internal Walls · Windows · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Intermediate Floor	18.0 °C	1.41 W/m²K	14.9 m²	0 W
Roof	-1.7 °C	0.23 W/m²K	14.9 m²	68 W
External Walls	-1.7 °C	0.45 W/m²K	22.6 m²	200 W
Internal Walls 1	18.0 °C	1.06 W/m²K	2.3 m²	0 W
Internal Walls 2	5.0 °C	1.06 W/m²K	5.5 m²	75 W
Internal Walls 3	22.0 °C	1.06 W/m²K	4.1 m²	-18 W
Windows	-1.7 °C	2.80 W/m²K	2.0 m²	111 W
Ventilation	-1.7 °C			231 W

Heat loss per m² — 45 W/m²

Emitter performance

502 W (75%) of 668 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 1000 mm	502 W	75 %

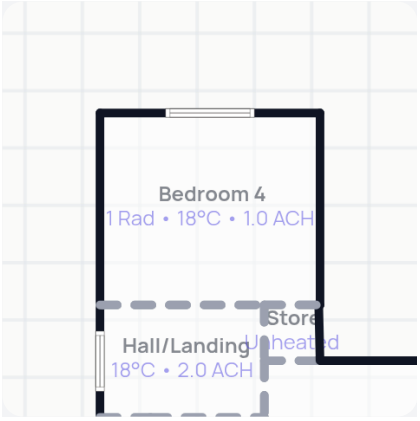
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Bedroom 4

Total heat loss	Room temp	Air changes per hour
635 W	18 °C	1.0

Floor area	Average height	Volume
12.9 m²	2.5 m	32.6 m³



Heat loss by element

635 W

Roof · External Walls · Internal Walls · Windows · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Intermediate Floor	18.0 °C	1.41 W/m²K	12.9 m²	0 W
Roof	-1.7 °C	0.23 W/m²K	12.9 m²	58 W
External Walls	-1.7 °C	0.45 W/m²K	24.7 m²	219 W
Internal Walls 1	18.0 °C	1.06 W/m²K	7.3 m²	0 W
Internal Walls 2	5.0 °C	1.06 W/m²K	2.4 m²	33 W
Windows	-1.7 °C	2.80 W/m²K	2.0 m²	111 W
Ventilation	-1.7 °C			214 W

Heat loss per m² — 49 W/m²

Emitter performance

502 W (79%) of 635 W at 50 °C

Radiator

EMITTER	IMAGE	DETAILS	EMITTER OUTPUT	% DEMAND MET*
Radiator		Type 21 (P+) 450 x 1000 mm	502 W	79 %

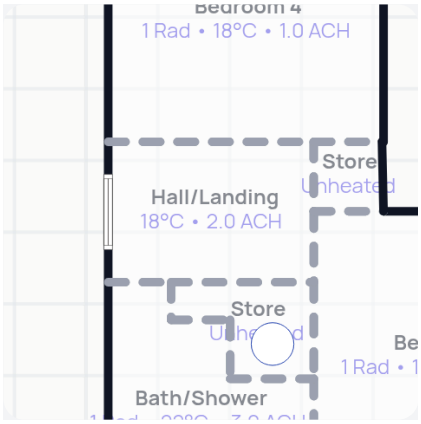
***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50 °C.

HEAT LOSS BY ROOM

Hall/Landing

Total heat loss	Room temp	Air changes per hour
400 W	18 °C	2.0

Floor area	Average height	Volume
5.6 m²	2.4 m	13.7 m³



Heat loss by element

400 W



Roof · External Walls · Internal Walls · Windows · Ventilation

	OTHER SIDE TEMPERATURE	U-VALUE	AREA	HEAT LOSS
Intermediate Floor	18.0 °C	1.41 W/m²K	5.6 m²	0 W
Roof	-1.7 °C	0.23 W/m²K	5.6 m²	25 W
External Walls	-1.7 °C	0.45 W/m²K	3.4 m²	31 W
Internal Walls 1	22.0 °C	1.06 W/m²K	2.1 m²	-9 W
Internal Walls 2	5.0 °C	1.06 W/m²K	7.2 m²	99 W
Internal Walls 3	18.0 °C	1.06 W/m²K	9.4 m²	0 W
Windows	-1.7 °C	2.80 W/m²K	1.3 m²	74 W
Ventilation	-1.7 °C			180 W

Heat loss per m² 71 W/m²

System design

This section presents our proposed system design for the property. The design is based on the detailed room by room calculations in the previous section.

Proposed heat pump

Based on the property's design heat loss of 7.16kW and on all the attributes of the property that we know of at this stage, we would suggest the following heat pump.

Ideal Logic Air 8kW	
Capacity at 50 °C (-1.7 °C)	8.02 kW
SCOP at 50 °C	3.96
Flow temperature	50 °C

This heat pump covers **112 %** of the heating requirement at and above the design temperature of **-1.7 °C**. The heat pump will be run on weather compensation so the efficiency will be higher when the weather is milder.

MCS certificate number
KIWA 00027/021 HP

Refrigerant
R32

Model number
AH750666

Sound power
55 dB(A)

Width
1095 mm

Height
1008 mm

Depth
518 mm

Weight
110 kg

Capacity (kW)

OUTSIDE TEMP	35°C	40°C	45°C	50°C	55°C
-7°C	8.18	8.06	7.93	7.98	7.5
-2°C	8.19	8.11	8.03	8.02	7.78
2°C	8.2	8.15	8.1	8.05	8
7°C	8	8	8	8	8

Seasonal Coefficient of Performance (SCOP)

SCOP is the average coefficient of performance over the heating season, accounting for the variation in outdoor temperature. Manufacturers have to test their equipment in standard conditions and report their SCOP performance data to be eligible for certification.

	35°	40°	45°	50°	55°
SCOP	5.09	4.69	4.3	3.96	3.63

Location

Out side kitchen window

- Mounting location: Ground
- Base to be built by: Builder
- Condensate drain: Soakaway to be dug



SYSTEM DESIGN

Emitters

Emitters (i.e., radiators/fan coils/underfloor heating) are a vital part of the heating system. They take the heat produced by the heat source and distribute that heat around the property.

Based on the room by room heat loss results, we propose the following emitter design for the property. This design will ensure each room can be heated to its set point when it's -1.7 °C outside whilst maintaining high system efficiency.

Design conditions

- Flow temperature = 50 °C
- Temperature drop across the radiator (delta T) = 5 °C
- Mean radiator temperature = 47.5 °C

Emitter replacements

We propose replacing or adding emitters in the following rooms:

1. Kitchen
2. Living/Lounge
3. Bath/Shower
4. Bedroom 1
5. Hall/Landing
6. Bedroom 3
7. Bedroom 4

SYSTEM DESIGN

Current emitters in the property

ROOM	IMAGE	TYPE	DETAILS	EMITTER OUTPUT	ROOM OUTPUT	ROOM DEMAND	% DEMAND MET*
Kitchen		Radiator	Type 21 (P+) 450 x 1100 mm	553 W	553 W	908 W	61 %
Living/Lounge		Radiator	Type 21 (P+) 450 x 1200 mm	522 W	522 W	1382 W	38 %
Bath/Shower		Radiator	Type 21 (P+) 450 x 500 mm	207 W	207 W	529 W	39 %
Bedroom 1		Radiator	Type 21 (P+) 450 x 1000 mm	502 W	502 W	594 W	85 %
Hall/Landing		Radiator	Type 21 (P+) 450 x 500 mm	251 W	251 W	271 W	93 %
Bedroom 2		Radiator	Type 22 (K2) 450 x 1400 mm	913 W	913 W	898 W	102 %
Bedroom 3		Radiator	Type 21 (P+) 450 x 1000 mm	502 W	502 W	668 W	75 %
Bath/Shower		Radiator	Type 21 (P+) 450 x 500 mm	207 W	207 W	878 W	24 %
Hall/Landing		–		0 W	0 W	400 W	0 %
Bedroom 4		Radiator	Type 21 (P+) 450 x 1000 mm	502 W	502 W	635 W	79 %

***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50.0 °C.

SYSTEM DESIGN

Proposed emitter changes

ROOM	STATUS	IMAGE	TYPE	DETAILS	EMITTER OUTPUT	ROOM DEMAND	% DEMAND MET*
Kitchen	Replacement		Radiator	Stelrad · Type 22 (K2) · White 450 x 1600 mm	1044 W	908 W	115 %
Living/Lounge	Replacement		Radiator	Stelrad · Type 22 (K2) · White 450 x 1800 mm	1018 W	1382 W	101 %
	New		Radiator	Stelrad · Type 11 (K1) · White 600 x 900 mm	373 W		
Bath/Shower	Replacement		Radiator	Stelrad · Type 22 (K2) · White 600 x 800 mm	548 W	529 W	104 %
Bedroom 1	Replacement		Radiator	Stelrad · Type 22 (K2) · White 450 x 1000 mm	615 W	594 W	104 %
Hall/Landing	Replacement		Radiator	Stelrad · Type 21 (P+) · White 600 x 500 mm	324 W	271 W	120 %
Bedroom 2	Keep		Radiator	Type 22 (K2) 450 x 1400 mm	913 W	898 W	102 %
Bedroom 3	Replacement		Radiator	Stelrad · Type 22 (K2) · White 450 x 1100 mm	718 W	668 W	107 %
Bath/Shower	Replacement		Radiator	Stelrad · Type 22 (K2) · White 900 x 600 mm	560 W	878 W	101 %
	New		Radiator	Stelrad · Type 22 (K2) · White 450 x 600 mm	323 W		
Hall/Landing	New		Radiator	Stelrad · Type 22 (K2) · White 450 x 700 mm	457 W	400 W	114 %
Bedroom 4	Replacement		Radiator	Stelrad · Type 22 (K2) · White 450 x 1000 mm	652 W	635 W	103 %

***% demand met:** This is calculated for a day when the outdoor temperature is -1.7 °C and the flow temperature is 50.0 °C.

SYSTEM DESIGN

Hot water

The heat pump will provide **100%** of the hot water requirement. Heat pumps cannot create heat as quickly as combi boilers, so they can't heat up hot water instantaneously when you need it. Instead we install a cylinder which stores hot water so it's always ready when you need it.

Proposed cylinder model

We've selected the following hot water cylinder based on the number of bedrooms in the property.

Ideal Logic Air Pre-Plumbed Slimline 1Zone 180L

Capacity	180 litres

Cylinder location

Big airing cupboard



Hot water performance calculations

The calculation below shows how much electricity we expect the heat pump to use for providing hot water. The calculations are based on typical usage.

Total electricity per year for hot water — 1,552 kWh

Annual demand

Volume per day	225 litres/day
Assumed mains water temp	10 °C
Storage temp	50 °C
Distribution efficiency	70 %
Heat demand per day	14.95 kWh
Days per year	365 days
Heat demand per year	5,458 kWh

Legionella cycles

Volume per cycle	180 litres
Tank starting temperature	50 °C
Legionella set point	60 °C
Distribution efficiency	70 %
Heat demand per cycle	2.99 kWh
Cycles per year	52
Heat provided by legionella cycles per year	156 kWh

Electricity consumption

Legionella cycle provided by	Heat pump
Heat energy provided by legionella cycle	156 kWh
Legionella cycle efficiency	170 %
Electricity consumption - legionella	91 kWh
Remaining heat demand	5,303 kWh
Hot water efficiency - normal operation	363 %
Electricity consumption - normal operation	1,461 kWh
Total electricity consumption	1,552 kWh
Overall efficiency	352 %

Reheat time — 1 h 5 min

Once depleted, it will take the cylinder **1 h 5 min** to fully reheat based on the following inputs:

Cylinder volume	180 litres

Mains water temp	10 °C
Hot water storage temp	50 °C
Heating power	7.8 kW

Sound assessment

Pass

To class as "permitted development" the heat pump design must comply with regulations regarding the sound level at a neighbour's nearest window/door. This section presents the results of the sound assessment we've conducted for the proposed heat pump and location, as set out in MCS 020a v1.0

This assessment accounts for:

- The sound level of the heat pump itself
- The influence of the space that it is in
- Any barriers between the heat pump and the assessment position

Results by position

Position 1	16 dB	Pass

SOUND ASSESSMENT

Position 1

Detached



Sound pressure level

Sound power level Ideal Logic Air 8kW AH750666	55 dB(A)
Reduction due to distance Reflective surfaces: two reflecting surfaces (Q=4) Distance (heat pump to assessment position): 50 m	39 dB(A)
Reduction due to barriers Full line of sight	0 dB(A)
Total	**16 dB(A)**

Result

Pass

Maximum allowed value	37 dB(A)
Final result at assessment position	**16 dB(A)**

Performance estimate

Predicting running costs with a heat pump is hard as it depends on a lot of factors, many of which are outside our control. But it's clearly really important that you're able to make an informed decision. So in this section we give you our best estimate of what the running costs and carbon savings will look like for the property if and when you switch to a heat pump.

We then provide an in-depth description of how we've calculated these figures in case you want to dig into the details. Please do ask us if anything doesn't make sense!

Summary

Bills

Current	£5,466
Proposed system	£1,184 to £1,423
Savings	**£4,043** to **£4,282**

Carbon

Current	3.0 tonnes CO_2
Proposed system	0.8 tonnes CO_2
Savings	**74%**

PERFORMANCE ESTIMATE

Detailed results

The running costs and carbon emissions of a heating system depends on a few key factors, all of which are explained in (even) more detail further down this report:

1. **Your property's heating and hot water demand**
   This is how much heat your property needs for heating and hot water in the year irrespective of what heating system is used to provide it. It's surprisingly hard to put a definitive number on this because it depends on how often you have the heating on and at what temperature, how much hot water you use, and the weather outside.
   - **Heating Degree Days** – Based on the heat loss calculations we have done combined with "heating degree day" data which represents the typical annual weather pattern in the area.

   We would usually also provide an estimate based on the EPC but we can't do that in this case because a representative EPC cannot be obtained for this property because of planned building work.

2. **The efficiency of your system**
   The efficiency of your system describes how much heat your system makes from what you pay for (electricity/gas/oil), both in heating and when making hot water. This depends on the system design, install quality, and how you run the system. We've included two sets of numbers here. One using fixed efficiencies from MCS and another using the Manufacturer's tested values.

   The MCS estimate uses standard efficiency values, which are the same for all heat pumps and only depend on the flow temperature the system is designed at. They tend to be more conservative. Manufacturer's efficiencies use their test data at standard conditions. We've included both to give you a fair picture of what to expect.

3. **Energy prices**
   Heat pump running costs depend on the price of electricity, and the comparison with your old system depends on the price of electricity. We've included numbers both at the price cap and with a heat pump tariff, to show the range of what you might pay depending on the tariff you are on. We've included more info on heat pump tariffs further down.

4. **Emission factors**
   Emission factors show how much carbon dioxide is emitted per unit of energy provided by a fuel. They are a measure of how "clean" a fuel is.

PERFORMANCE ESTIMATE

MCS031 Performance estimate

The table below shows a performance estimate in MCS's required table layout following the methodology laid out in MCS 031 Issue 4.0.

Heat Pump System Performance Estimate	
Your energy requirements	
Energy required for heating	**16,698** kWh
Demand to be supplied by the heat pump	**16,698** kWh
Energy required for hot water	**5,458** kWh
Demand to be supplied by the heat pump	**5,458** kWh
Your property	
Your postcode prefix	**TW**
Total property floorspace (not property footprint)	**98** m^2
Average watts per square metre Note: W/m2 is a measure of your property's thermal efficiency. 0-30W/m2 is very low heat loss and 120-150W/m2 is very high heat loss.	**73** W/m^2
Proposed system	
Heat pump capacity	**8.0** kW
Heat pump type	**ASHP**
Your system is proposed to provide:	**Space heat and hot water**
Your proposed heating system will be (select one):	**Upgraded radiators**
The proposed flow temperature will be	**50** °C
Performance	
The Seasonal Performance Factor is calculated to be:	**3.1**
Estimate of energy consumption of the proposed heat pump (or combined system where Hybrid). Note: you can convert these figures to approximate running costs.	**High: 9,457** kWh → **Low: 7,737** kWh
Important Note: This is not a detailed system design. It offers a reasonable estimate of likely performance and a description of the likely design. This estimate is based on a full heat loss survey and design.	
Applicable warning notes (from Table 2): None	

PERFORMANCE ESTIMATE

Results table - Manufacturer's efficiencies

This table shows a granular breakdown of the potential energy consumption and running costs of your heat pump, based on different estimates of your property's energy demand and different energy tariffs that you might choose. We are also using heat pump efficiencies (i.e. SCOP) based on the manufacturer's test data, which often shows higher efficiencies than MCS's fixed values.

Warning: In accordance with MCS standards you should treat any performance estimate that differs from the MCS031 calculations with caution. We have included it because we think it's helpful to show you how different estimates of your heating demand affect the overall performance, how the tariff you choose can affect the running costs of the system, and the potential efficiency of the heat pump based on the manufacturer's own test data.

If you have any questions about this, please do let us know and we'll be happy to talk you through it.

	BASED ON HEAT LOSS CALCULATIONS AND HEATING DEGREE DAYS		BASED ON EPC	BASED ON LAST YEARS CONSUMPTION
Bills	Existing (Electricity)*	Heat pump (Electricity)	Unavailable	Unavailable
Price cap (24.67 p/kWh)	£5,466	£1,423 £4,043		
Scottish Power (21.67 p/kWh)	£5,466	£1,250 £4,216		
Octopus Cosy (20.53 p/kWh)	£5,466	£1,184 £4,282		

* Based on an existing Electricity price of 24.67 p/kWh

Carbon	Existing (Electricity)	Heat pump (Electricity)	Unavailable	Unavailable
Totals	3,013 kg	785 kg 2,228 kg		

Consumption	Existing (Electricity)	Heat pump (Electricity)	Unavailable	Unavailable
Heating	16,698 kWh	4,217 kWh		
Hot Water	5,458 kWh	1,552 kWh		
Total	22,156 kWh	5,769 kWh		

Demand			Unavailable	Unavailable
Heating	16,698 kWh			
Hot Water	5,458 kWh			
Total	22,156 kWh			

Efficiency	Existing (Electricity)	Heat pump (Electricity)	Unavailable	Unavailable
Heating	100 %	396 %		
Hot water	100 %	352 %		

PERFORMANCE ESTIMATE

Inputs and assumptions

In each of the following sections, we break down how we've calculated the numbers that appear in the results table.

Heat energy required

To work out how much energy the property needs to keep it warm, we first have to work out how much heat is required. That might sound strange, but because different heating sources have wildly different efficiencies, this heat energy number will need to be divided by the system efficiency (see next section) to calculate the actual energy required.

	BASED ON HEAT LOSS CALCULATIONS AND HEATING DEGREE DAYS	BASED ON EPC	BASED ON LAST YEARS CONSUMPTION
	2033 degree days, 342 W/°C	Unavailable	Unavailable
Heating	16,698 kWh		
Hot water	5,458 kWh		
Total	**22,156 kWh**		

System efficiency

The efficiency of a heating system describes how much useful output (heat) you get per unit of what you pay for (electricity/gas/oil). A system's efficiency will often be different when it is doing space heating vs. when it's making hot water because the temperature that the system is heating the water to is often hotter in water heating cycles. We have used the following inputs when modelling the system.

Existing heating system

Existing heating system fuel:	Electricity
Efficiency - space heating:	100%
Efficiency - hot water:	100%

Heat pump system

Type of system:	Air source heat pump
Model:	Ideal Logic Air 8kW
MCS certificate numbers:	KIWA 00027/021 HP
Flow temperature - space heating:	50°C
Flow temperature - hot water:	55°C

	MCS SPF	MANUFACTURERS SCOP
Heating efficiency	310 %	396 %
Hot water efficiency	170 %	352 %

Energy prices

As the last few years have shown, energy prices are very hard to predict. In modelling bills we have used the current energy price cap and also shown you a few different heat pump tariff options. Energy tariffs can also vary by supplier and change over time, so we'd recommend not making your decision based purely on a specific tariff or running cost figure.

There are an increasing number of heat pump tariffs that give you access to cheaper electricity. These are typically **time of use** tariffs which charge you different amounts depending on when you use the electricity. So you can set the hot water heating schedule (and to a lesser extent the space heating schedule) to make use of lower prices.

If you have solar (or are planning to install it), the electricity prices will also be lower because the heat pump will use some of the electricity that the solar is generating. This is especially true for hot water consumption because you can schedule the hot water to run in the middle of the day.

ELECTRICITY	
Existing price	24.67 p/kWh

ELECTRICITY	
Price cap Price cap 1st April - 30th June 2026	24.67 p/kWh
Scottish Power Based on Scottish Power's heat pump saver tariff as of April 2026	21.67 p/kWh
Octopus Cosy Based on Octopus's expectations of customer consumption patterns on the Cosy Octopus tariff as of April 2026	20.53 p/kWh

Emission factors

We've used the emission factors from the government's SAP 2010 methodology. For electricity this value is fixed but for electricity it is falling over time as the grid decarbonises. This means the system will get cleaner and cleaner. The value used here is based on a projected continued reduction in grid carbon intensity.

Electricity	Electricity
136 gCO2/kWh	136 gCO2/kWh

Dependence of performance on flow temperature

How much electricity the heat pump will use to provide heating depends on the flow temperature that the system runs at. We have designed the system to run at 50°C when it's -1.7°C outside and we'll set it up to use weather compensation so it runs more efficiently at milder temperatures.

To demonstrate the importance of flow temperature, the table below shows how much electricity the system would consume to provide heating at a range of flow temperatures. This graph is based on the heat loss calculations and heating degree days based estimate, but the pattern would be similar for any of the inputs.

	35°	40°	45°	50°	55°
SCOP	5.09	4.69	4.3	3.96	3.63
Electricity consumed (kWh/year)	4353	4724	5153	5595	6104

PERFORMANCE ESTIMATE

MCS Key facts - Energy Performance Estimate

Predicting the heat demand of a building, and therefore the performance and running costs of heating systems, is difficult to predict with certainty due to the variables discussed here. These variables apply to all types of heating systems, although the efficiency of heat pumps is more sensitive to good system design and installation. For these reasons your estimate is given as guidance only and should not be considered as a guarantee.

Seasonal Coefficient of Performance:

MCS Seasonal Coefficient of Performance (SCoP) is derived from the EU ErP labelling requirements, and is a theoretical indication of the anticipated efficiency of a heat pump over a whole year using standard (i.e. not local) climate data for 3 locations in Europe. It is used to compare the relative performance of heat pumps under fixed conditions and indicates the units of total heat energy generated (output) for each unit of electricity consumed (input). As a guide, a heat pump with a MCS SCoP of 3 indicates that 3 kWh of heat energy would be generated for every 1 kWh of electrical energy it consumes over a 'standard' annual cycle.

Energy Performance Estimate

An Energy Performance Certificate (EPC) is produced in accordance with a methodology approved by the government. As with all such calculations, it relies on the accuracy of the information input. Some of this information, such as the insulating and air tightness properties of the building may have to be assumed and this can affect the final figures significantly leading to uncertainty especially with irregular or unusual buildings.

Identifying the uncertainties of energy predictions for heating systems

We have identified 3 key types of factor that can affect how much energy a heating system will consume and how much energy it will deliver into a property. These are 'Fixed', 'Variable' and 'Random'. Most factors are common to ALL heating systems regardless of the type (e.g oil, gas, solid fuel, heat pump etc.) although the degree of effect varies between different types of heating system as given in the following table.

The combined effect of these factors on energy consumption and the running costs makes overall predictions difficult however an accuracy ± 25-30% would not be unreasonable in many instances. Under some conditions even this could be exceeded (e.g. considerable opening of windows). Therefore it is advised that when making choices based on mainly financial criteria (e.g. payback based on capital cost versus net benefits such as fuel savings and financial incentives) this variability is taken into account as it could extend paybacks well beyond the period of any incentives received, intended occupancy period, finance agreement period etc.

'Fixed' which include:

Factor	Impact
Equipment Selection Performance figures (SCoP) from ErP data	System Efficiency
Energy Assessment via the EPC (e.g. assumptions as to fabric construction and levels of insulation; the variation in knowledge and experience of Energy Assessors)	Energy Required

'Variable' which are affected by the system design and include:

Factor	Impact
Accuracy of sizing of heat pump-i.e. closeness of unit output selection (kW) to demand heat requirement (kW)	System Efficiency
Design space and ambient (external) temperatures	Energy Required
Design flow / return water temperatures and weather compensation	System Efficiency
Type of Heat emitter (e.g. Under-floor; natural convector (e.g. radiator), fan convector etc.)	System Efficiency

'Random' which cannot be anticipated and include:

Factor	Impact
User behaviour:	
• Room temperature settings	Energy Required
• Hot water usage and temperature settings	Energy Required
• Occupancy patterns/times	Energy Required
• Changing the design HP flow temperatures	System Efficiency
• Ventilation (i.e. opening windows)	Energy Required
Annual climatic variations (i.e. warmer and colder years than average)	Energy Required

Key

The statement at the end of each item indicates the major factor affected as follows:

Energy Required: the heat energy output requirement of the system which directly impacts on running costs. This requirement exists regardless of the heating system chosen as it is the heat required to keep the space comfortable. Opening windows or increasing room temperatures will demand more heat output, which means more energy input but this would NOT directly affect the efficiency. Thus increased energy demand does NOT automatically mean reduced efficiency.

System Efficiency: the efficiency of the system has been directly affected and will therefore demand more input energy to achieve the same heat output thus increasing running costs. However, increased energy input does NOT necessarily mean lower system efficiency (see above).