Summary Report

Project Reference: Fron Uchaf Fron Isaf, Chirk Wales, LL14 5AL

Heating Type: ASHP

Installation Address

Fron Uchaf Farm

Fron Isaf

Chirk

LL14 5AL

This report was completed by: Stephen Coyle

Summary of Results

The total heat source required to heat the building must provide an output of **18.87 kW.**

When the external temperature is **-3.3°C.**

Heating System Details

Heating Type:	Air Source Heat Pump
Manufacturer:	Stiebel Eltron
Model(s):	HPA-O 13.2 Trend HC 230, HPA-O 13.2 Trend HC 230
Certification Number(s):	011-1W0982_01, 011-1W0982_01
Output at designed external temperature:	26.40 kW
Maximum designed flow temperature:	50°C

ASHP = Air Source Heat Pump

Worst Performing Room

Room Name:	Cellar
Floor Area:	29.36 m²
Power demand:	6,096.14 W
Specific room heat loss:	207.63 W/m²
Emitter type:	Standard Radiators
Seasonal Coefficient of Performance (SCOP):	3.92
Temperature Star Rating:	★★★☆☆

The methods used in these calculations are from the Chartered Institution of Building Services Engineers (CIBSE) The Domestic Heating Design Guide and EN 12831. The UK standards for MCS MIS 3005 and MIS 3004 have also been met ensuring heat pumps and Biomass calculations can be presented.

This document regulates the application of both the detailed procedure according to DIN EN 12831-1:2017-09, Section 6 and the simplified procedure according to DIN EN 12831-1:2017-09, Section 7 and Section 8. In addition, in Section 7 of this document describes another method for roughly determining the building heating load from heat quantity or consumption measurements.

Heat Loss

Room Name	W/m²	Total Watts	Total kWh
Cellar	207.63	6,096.14	10,666.2
Living Room	104.91	2,190.46	3,568.25
Dining Room	66.36	1,720.72	2,814.66
Hall	48.23	594.7	1,744.56
Study	115.93	1,082.83	1,798.27
Kitchen	58.29	1,077.13	2,572.33
Living Room 1	28.56	660.62	1,037.84
Hallway	79.35	334.86	740.56
Toilet	27.62	124.83	369.38
Bedroom 1	72.57	1,164.75	2,261.89
Hallway	36.94	425.97	888.15
Landing	41.63	557.81	1,166.07
Master Bedroom	80.35	1,797.5	3,453.72
Bedroom 2	51.52	724.39	1,470.52
Bedroom 3	100.88	1,622.12	2,908.3
En Suite	164.92	941.68	1,236.57
Bathroom	76.27	724.54	833.38

Current Emitters

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
21	Living Room	2,190.46	Water Radiator (current)	BOE	0.438	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
21	Dining Room	1,720.72	Water Radiator (current)	BOE	0.438	600	1000	0.00	0.00	0.00	0.00	0.0
			Water Radiator (current)	BOE	0.438	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
18	Hall	594.70	Water Radiator (current)	BOE	0.504	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
21	Study	1,082.83	Water Radiator (current)	BOE	0.438	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
18	Kitchen	1,077.13	Water Radiator (current)	BOE	0.504	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			

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21	Living Room 1	660.62	Water Radiator (current)	BOE	0.438	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
18	Hallway	334.86	Water Radiator (current)	BOE	0.504	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
18	Bedroom 1	1,164.75	Water Radiator (current)	BOE	0.504	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
18	Hallway	425.97	Water Radiator (current)	BOE	0.504	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
18	Master Bedroom	1,797.50	Water Radiator (current)	BOE	0.504	700	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
18	Bedroom 2	724.39	Water Radiator (current)	BOE	0.504	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
18	Bedroom 3	1,622.12	Water Radiator (current)	BOE	0.504	600	1000	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
22	En Suite	941.68	Towel Radiator (current)	BOE	0.417	1000	500	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			
22	Bathroom	724.54	Water Radiator (current)	BOE	0.417	600	700	0.00	0.00	0.00	0.00	0.0
								Total Watts	0.00			

Proposed Emitters

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
21	Living Room	2,190.46	K2 (proposed)	BOE	0.427	700	3000	22.89	2,412.14	0.10	6.36	100.0
								Total Watts	2,412.14			
21	Dining Room	1,720.72	K2 (proposed)	BOE	0.427	700	2400	18.31	1,929.71	0.08	5.00	100.0
								Total Watts	1,929.71			
18	Hall	594.70	K2 (proposed)	BOE	0.493	700	1000	7.63	928.32	0.03	1.73	100.0
								Total Watts	928.32			
21	Study	1,082.83	K2 (proposed)	BOE	0.430	600	1600	10.56	1,143.48	0.05	3.15	100.0
								Total Watts	1,143.48			
18	Kitchen	1,077.13	K2 (proposed)	BOE	0.496	600	1400	9.24	1,153.94	0.05	3.13	100.0
								Total Watts	1,153.94			
21	Living Room 1	660.62	K2 (proposed)	BOE	0.430	600	1000	6.60	714.68	0.03	1.92	100.0
								Total Watts	714.68			

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
18	Hallway	334.86	P+ (proposed)	BOE	0.493	600	1000	6.60	636.78	0.02	0.97	100.0
								Total Watts	636.78			
18	Toilet	124.83	P1 (proposed)	BOE	0.504	450	700	1.80	161.06	0.01	0.36	100.0
								Total Watts	161.06			
18	Bedroom 1	1,164.75	K2 (proposed)	BOE	0.496	600	1600	10.56	1,318.79	0.06	3.38	100.0
								Total Watts	1,318.79			
18	Hallway	425.97	P+ (proposed)	BOE	0.493	600	1000	6.60	636.78	0.02	1.24	100.0
								Total Watts	636.78			
18	Landing	557.81	P+ (proposed)	BOE	0.493	600	1000	6.60	636.78	0.03	1.62	100.0
								Total Watts	636.78			
18	Master Bedroom	1,797.50	K2 (proposed)	BOE	0.493	700	2000	15.26	1,856.62	0.09	5.22	100.0
								Total Watts	1,856.62			
18	Bedroom 2	724.39	K2 (proposed)	BOE	0.496	600	1000	6.60	824.25	0.03	2.10	100.0
								Total Watts	824.25			

Room Temperature °C	Room Names	Room Heat Loss	Radiator Type	Connection Type	Conversion Factor	Height (mm)	Length (mm)	Volume (L)	Custom defined MWT 47.5 °C Output Watts	Mass Flow Rate (kg/s)	Volume Flow Rate (L/m)	Proportion (%)
18	Bedroom 3	1,622.12	K2 (proposed)	BOE	0.493	700	2000	15.26	1,856.62	0.08	4.71	100.0
								Total Watts	1,856.62			
22	En Suite	941.68	K2 (proposed)	BOE	0.408	600	1400	9.24	950.65	0.05	2.74	100.0
								Total Watts	950.65			
22	Bathroom	724.54	K2 (proposed)	BOE	0.408	600	1200	7.92	814.84	0.03	2.10	100.0
								Total Watts	814.84			

Heat Pump running costs breakdown

This table shows the breakdown of energy consumption and costs for your heat pump system, including renewable heat generated and the electricity you pay for.

		Energy kWh	Annual running cost
Heating and Hot Water	**Renewable heat**	29,446	0
	Energy you pay for	10,084.35	2,603

Method used

This section details how the energy consumption is calculated and distributed between heating/hot water and the pasteurisation cycle for hot water safety.

	Energy kWh
Heating and Hot Water	10,084
***Hot Water includes pasteurisation cycle**	0
Total	10,084

Estimated running costs & comparison

This table provides a comprehensive comparison of different ***heating fuel types*** and their performance characteristics. It shows ***efficiency ratings*** for both hot water and space heating, ***annual energy demands*** in kilowatt-hours, and ***cost analysis*** including unit prices and annual running costs. The comparison includes ***environmental impact*** through CO, emissions factors and total annual emissions. This analysis enables informed decision-making by comparing the ***economic viability***, ***energy efficiency***, and ***environmental performance*** of different heating systems, helping to identify the most cost-effective and sustainable heating solution for the property.

Heating Type	Efficiency%		Annual Energy Demand kWh			kWh/Unit	Price per unit	Pence per kWh	£ / kWh	Pence / day standing charge	Total annual running cost	C02 emissions	
	Hot water	Heating	Hot water	Heating	Total							factor (kg/kWh)	Total kg
Air Source Heat Pump	(SCOP) 3.72	(SCOP) 3.92	3,820.64	39,530.64	43,351.28	1.00	24p / 1	24.00	0.24	50.00	£2,602.74	0.233	2,589
Mains Gas	85%	85%	3,962.14	39,530.64	43,492.78	1.00	10p / 1	10.00	0.10	25.00	£5,208.05	0.227	11,615
Oil	85%	85%	3,962.14	39,530.64	43,492.78	10.35	75p / 10.35	7.25	0.07	0.00	£3,707.82	0.314	16,067
LPG	90%	90%	3,962.14	39,530.64	43,492.78	7.11	75p / 7.11	10.55	0.11	0.00	£5,097.61	0.259	12,516
Ground Source Heat Pump	(SCOP) 3.1	(SCOP) 3.4	3,820.64	39,530.64	43,351.28	1.00	24p / 1	24.00	0.24	0.00	£3,086.19	0.233	2,996