



# THE BUILDING COMPLIANCE TEAM

**REFERENCE: TBCT/25/07/WI/15MP/ES**

**CLIENT: WAYLAN INVESTMENTS LTD**

**ADDRESS: Oceanview, 15 Montague Place, Worthing**

**DEVELOPMENT DETAILS: Conversion of residential storage space (C3) at second floor level to provide one additional flat**

**Application Reference: AWDM/1593/24**

**DATE: 04/07/2025**

**PRODUCED BY:**

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# 1. INTRODUCTION

This Energy Statement has been prepared to support planning application AWDM/1593/24 for the conversion of residential storage space to create one additional flat at Oceanview, 15 Montague Place, Worthing.

The statement demonstrates compliance with Worthing Local Plan policies DM16 (Sustainable Design) and DM17 (Energy), specifically addressing the requirements for CO2 reduction, renewable energy provision, overheating mitigation, and waste management.

The proposed development involves the conversion of existing second floor storage space within a residential building to create a new flat. This statement sets out how the development will achieve sustainable design standards and contribute to Worthing Borough Council's climate emergency objectives.

## 2. PLANNING POLICY CONTEXT

### Policy DM16 - Sustainable Design

Policy DM16 of the Worthing Local Plan requires all new development to achieve high standards of sustainable design. The policy specifically requires new build housing to achieve a minimum 20% CO2 reduction compared to Building Regulations Part L 2013 standards through energy efficiency measures. The policy states:

**"All new build housing will achieve a minimum 20% CO2 reduction compared to the Building Regulations Part L 2013 standard through energy efficiency measures, unless superseded by national policy or Building Regulations."**

It is important to note that this policy was drafted when Part L 2013 was the current standard. Since then, Building Regulations have been updated with Part L 2021 introducing significantly more stringent energy efficiency requirements. This development has been designed to comply with the current Part L 2021 standards, which inherently exceed the baseline referenced in the policy.

The policy also requires developments to incorporate design measures to minimise excessive solar gain and maximise opportunities for passive cooling, follow the waste hierarchy to minimise waste, and achieve high Energy Performance Certificate ratings.




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## Policy DM17 - Energy

Policy DM17 requires new housing and major non-residential development to incorporate renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements. The policy states:

**"All new housing and major non-residential development should incorporate renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements (after CO2 reductions from energy efficiency measures)."**

The policy supports the development of renewable, low carbon, or decentralised energy schemes where proposals are located appropriately and do not cause unacceptable impacts on surrounding uses or the local environment.

## 3. ENERGY EFFICIENCY AND CO2 REDUCTION

### Fabric First Approach

The development adopts a fabric first approach to minimise energy demand through enhanced building fabric performance. The proposed U-values significantly exceed Building Regulations requirements:

- External walls: 0.18 W/m<sup>2</sup>K (significantly better than Part L requirements)
- Roof: 0.14 W/m<sup>2</sup>K (excellent thermal performance)
- Windows and doors: 1.3 W/m<sup>2</sup>K (high performance double glazing)
- Floor: Party floor with neighbouring flat (U-value = 0)

These enhanced fabric standards ensure minimal heat loss and reduced energy demand for space heating, contributing to the overall sustainability of the development.

### CO2 Emissions Reduction

#### Building Regulations Context

It should be noted that while Policy DM16 references Part L 2013 standards as the baseline for comparison, this development has been designed to meet the more stringent Approved Document L 2021 standards. The 2021 standards already incorporate significant improvements in energy efficiency requirements compared to the 2013 baseline.

By designing to 2021 standards, the development inherently exceeds the policy requirements which are based on 2013 standards.

## Performance Against Policy Requirements

The development achieves a substantial reduction in CO2 emissions through its energy efficiency measures. The baseline Part L 2021 CO2 emission rate for the development is 0.60 kgCO<sub>2</sub>/m<sup>2</sup>/year. Through the implementation of enhanced fabric standards and efficient systems, the achieved CO2 emission rate is 0.39 kgCO<sub>2</sub>/m<sup>2</sup>/year. (See Appendices)

This represents a 35% reduction in CO2 emissions compared to the Part L 2021 baseline, significantly exceeding the 20% minimum requirement set out in Policy DM16. The calculations demonstrate that the development goes well beyond the minimum standards, contributing positively to Worthing's carbon neutral objectives.

The enhanced performance is particularly noteworthy given that the development already complies with the more onerous 2021 Building Regulations, demonstrating a commitment to sustainability that exceeds both current regulatory requirements and local planning policy.

### Energy Performance

The predicted annual energy consumption for the flat is 2,868 kWh/year, which represents excellent energy efficiency for a residential unit of this size. The combination of high-performance building fabric and efficient heating systems ensures low running costs for future occupants and reduced environmental impact.

## 4. RENEWABLE AND LOW CARBON ENERGY

### Air Source Heat Pump System

To meet the requirements of Policy DM17, the development incorporates a specialist air source heat pump cylinder (Dimplex EDL200UK-630) for hot water provision. This renewable technology extracts heat from the ambient air to efficiently heat water, providing a low carbon alternative to traditional electric or gas water heating.

The air source heat pump system provides 18.7% of the total energy demand for the flat, exceeding the 10% minimum requirement set out in Policy DM17. This substantial contribution from renewable energy further reduces the carbon footprint of the development and provides long-term energy cost savings for occupants.

### Heating Strategy

Space heating is provided through efficient electric panel heaters. While not classified as renewable technology, when combined with the high-performance building fabric, this represents an appropriate solution for a small, well-insulated flat. The minimal heating demand due to excellent insulation standards ensures that energy consumption remains low.



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## 5. OVERHEATING MITIGATION

### Design Measures

The development incorporates several design measures to prevent overheating and ensure occupant comfort during summer months, addressing the requirements of Policy DM16. The flat features east-facing windows, which receive morning sun but avoid the intense afternoon solar gain associated with west-facing orientations.

Internal blinds are provided to all windows, allowing occupants to control solar gain throughout the day. While external shading is generally more effective, internal blinds provide flexibility and user control, enabling residents to balance daylight, views, and thermal comfort according to their preferences.

### Ventilation Strategy

The development employs a natural ventilation strategy, utilizing openable windows to provide fresh air and cooling. The east-facing orientation facilitates morning purge ventilation when external temperatures are lowest, allowing the flat to release accumulated heat from the previous day. Natural ventilation represents a passive cooling approach that avoids the energy consumption associated with mechanical systems.

## 6. WASTE AND RECYCLING MANAGEMENT

### Compliance with Policies DM16 and DM17

The development addresses waste management requirements through integration with the existing communal waste facilities at Oceanview. The building provides an established communal bin store that serves all residents, with adequate capacity to accommodate the additional flat.

The existing bin store provides separate facilities for general waste and recycling, enabling high rates of recycling and re-use in accordance with the waste hierarchy. This arrangement ensures that waste management for the new flat is fully integrated with the existing building systems, avoiding the need for additional external storage that could impact the street scene.

### Access Arrangements

Residents of the new flat will access the communal bin store using the same routes and arrangements as existing residents in the block. This ensures equity of access and maintains the established waste collection patterns. The internal access route from the flat to the bin store is well-lit, ensuring safe and convenient access for all users including those with mobility requirements.




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The communal approach to waste management represents an efficient use of space and resources, avoiding duplication of facilities and ensuring that adequate capacity exists for source separation of recyclable materials.

## 7. CONSTRUCTION WASTE MINIMISATION

### Conversion Benefits

As a conversion of existing space rather than new build construction, the development inherently minimizes construction waste. The reuse of the existing building structure and fabric represents the most sustainable approach, avoiding the embodied carbon and waste associated with demolition and new construction.

Any construction waste generated during the conversion works will be managed in accordance with the waste hierarchy, prioritizing reuse and recycling over disposal. Given the limited scope of works required for the conversion, construction waste is expected to be minimal.

## 8. CONCLUSION

This Energy Statement demonstrates that the proposed conversion at Oceanview, 15 Montague Place fully complies with Worthing Local Plan policies DM16 and DM17. The development exceeds the minimum requirements in several key areas:

The development achieves a 35% reduction in CO2 emissions compared to Part L 2013 standards, significantly exceeding the 20% minimum requirement. This is achieved through a fabric first approach with U-values that substantially exceed Building Regulations requirements.

The incorporation of an air source heat pump system for hot water provides 18.7% of total energy demand from renewable sources, exceeding the 10% minimum requirement in Policy DM17. This renewable technology reduces carbon emissions and provides long-term energy cost benefits.

Overheating risks are mitigated through appropriate orientation, internal shading, and natural ventilation strategies. The east-facing aspect and provision of internal blinds allow occupants to control solar gain while maintaining daylight and views.

Waste management is fully integrated with existing building facilities, providing convenient access to recycling and waste disposal in accordance with the waste hierarchy.

The proposed development represents a sustainable approach to creating additional housing within the existing urban fabric, making efficient use of underutilized space while achieving high standards of energy efficiency and renewable energy provision. The scheme contributes positively to Worthing's climate emergency objectives and provides a high-quality, energy-efficient home for future occupants.



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# Appendices

## Appendix A - Baseline SAP Calcs and Proposed SAP Calc



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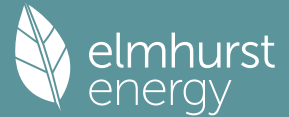


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# Full SAP Calculation Printout



Property Reference	New Unit - Baseline		Issued on Date	08/07/2025	
Assessment Reference	New Unit - Baseline	Prop Type Ref			
Property					
SAP Rating	53 E	DER	14.43	TER	
Environmental	90 B	% DER < TER			N/A
CO <sub>2</sub> Emissions (t/year)	0.64	DFEE	73.15	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	148.85	TPER	
Assessor Details	Mr. Aharon Horwich			Assessor ID	AV59-0001
Client	A, A				

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)  
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

Main dwelling	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.8250 (5)

2. Ventilation rate

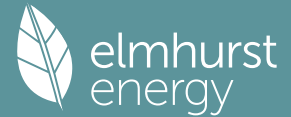
		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) =	0.1565 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.9065 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7705 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9824	0.9631	0.9439	0.8475	0.8283	0.7320	0.7320	0.7127	0.7705	0.8283	0.8668	0.9053 (22b)
Effective ac	0.9825	0.9638	0.9454	0.8592	0.8430	0.7679	0.7679	0.7540	0.7968	0.8430	0.8757	0.9098 (25)

3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K					
Main dwelling												
Glazing			12.0500	1.3258	15.9754		(27)					
Door			1.9500	1.4000	2.7300		(26)					
External Wall	41.4450	12.0500	29.3950	0.3000	8.8185		(29a)					
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)					
External Roof 1	51.1300		51.1300	0.1600	8.1808		(30)					
Total net area of external elements Aum(A, m <sup>2</sup> )			95.7050				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.9053	(33)					
Main dwelling												
Party Floor 1			51.1300				(32d)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							250.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							19.1410 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	55.0463 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	41.4456	40.6552	39.8804	36.2415	35.5607	32.3913	32.3913	31.8044	33.6121	35.5607	36.9380	38.3779 (38)
Heat transfer coeff	96.4918	95.7014	94.9267	91.2878	90.6070	87.4376	87.4376	86.8507	88.6584	90.6070	91.9843	93.4242 (39)

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Average = Sum(39)m / 12 =

91.2845

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.8872	1.8717	1.8566	1.7854	1.7721	1.7101	1.7101	1.6986	1.7340	1.7721	1.7990	1.8272 (40)
HLP (average)												1.7853
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

#### 4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7234 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869	(42b)
Hot water usage for other uses	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794	(42c)
Average daily hot water use (litres/day)													50.6367 (43)
Daily hot water use	55.2440	53.7291	52.0750	50.0157	48.1788	46.2697	45.8726	47.5233	49.2164	51.1769	53.2545	55.1663	(44)
Energy content (annual)	87.4929	76.5095	80.0374	68.4690	64.8579	56.8941	55.4789	58.8438	60.6887	69.4466	75.8708	86.3771	(45)
Energy content (annual)													840.9668
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(64)
Total per year (kWh/year) = Sum(64)m =													715 (64)
12Total per year (kWh/year)													715 (64)
Electric shower(s)	42.5365	37.9004	41.3858	39.4939	40.2350	38.3803	39.6597	40.2350	39.4939	41.3858	40.6076	42.5365	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													483.8505 (64a)
Heat gains from water heating, kWh/month	29.2264	25.7334	27.3544	24.4231	23.8411	21.6851	21.7042	22.5631	22.7698	25.1039	26.2744	28.9893	(65)

#### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	75.7427	83.8579	75.7427	78.2674	75.7427	78.2674	75.7427	75.7427	78.2674	75.7427	78.2674	75.7427	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1683	151.7266	147.7998	139.4401	128.8874	118.9694	112.3436	110.7853	114.7121	123.0719	133.6245	143.5425	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	(71)
Water heating gains (Table 5)	39.2828	38.2937	36.7667	33.9210	32.0444	30.1181	29.1723	30.3267	31.6248	33.7417	36.4923	38.9641	(72)
Total internal gains	314.0448	322.7293	309.1602	300.4796	285.5256	276.2061	266.1096	265.7058	273.4554	281.4073	297.2353	307.1003	(73)

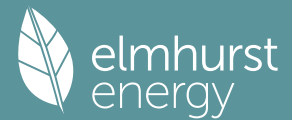
#### 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W							
East	12.0500	19.6403	0.5500	0.9000	0.7700	81.1844 (76)							
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621	(83)
Total gains	395.2292	481.5433	570.7042	681.9259	753.0024	754.7518	721.7047	657.0552	577.6419	469.8535	398.4627	373.8624	(84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	36.7979	37.1018	37.4046	38.8956	39.1879	40.6083	40.6083	40.8828	40.0492	39.1879	38.6011	38.0062	
alpha	3.4532	3.4735	3.4936	3.5930	3.6125	3.7072	3.7072	3.7255	3.6699	3.6125	3.5734	3.5337	
util living area	0.9941	0.9878	0.9725	0.9241	0.8249	0.6577	0.5076	0.5668	0.8078	0.9577	0.9893	0.9952	(86)
MIT	18.7477	19.0264	19.4741	20.1085	20.5829	20.8798	20.9650	20.9483	20.7250	20.0729	19.3418	18.7651	(87)
Th 2	19.4096	19.4202	19.4307	19.4802	19.4896	19.5336	19.5336	19.5418	19.5166	19.4896	19.4707	19.4510	(88)
util rest of house	0.9919	0.9834	0.9619	0.8945	0.7572	0.5384	0.3504	0.4060	0.7082	0.9352	0.9846	0.9935	(89)
MIT 2	16.8815	17.2421	17.8135	18.6222	19.1618	19.4725	19.5248	19.5268	19.3436	18.6050	17.6769	16.9283	(90)
Living area fraction													0.6374 (91)
MIT	18.0710	18.3794	18.8720	19.5696	20.0676	20.3695	20.4428	20.4329	20.2241	19.5406	18.7381	18.0991	(92)
Temperature adjustment													0.0000
adjusted MIT	18.0710	18.3794	18.8720	19.5696	20.0676	20.3695	20.4428	20.4329	20.2241	19.5406	18.7381	18.0991	(93)

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## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9893	0.9793	0.9570	0.8966	0.7859	0.6098	0.4505	0.5079	0.7609	0.9361	0.9814	0.9912	(94)
Useful gains	390.9926	471.5767	546.1707	611.4049	591.7598	460.2687	325.1541	333.7155	439.5207	439.8399	391.0629	370.5817	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1328.7900	1289.9969	1174.4312	974.0006	758.1658	504.4714	336.0041	350.2571	542.9513	810.0807	1070.5240	1298.5091	(97)
Space heating kWh	697.7213	549.9784	467.4258	261.0689	123.8061	0.0000	0.0000	0.0000	0.0000	275.4592	489.2120	690.3780	(98a)
Space heating requirement - total per year (kWh/year)												3555.0496	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	697.7213	549.9784	467.4258	261.0689	123.8061	0.0000	0.0000	0.0000	0.0000	275.4592	489.2120	690.3780	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3555.0496	
Space heating per m2												69.5296	(99)

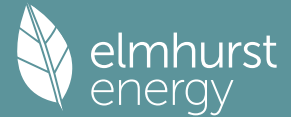
## 9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	697.7213	549.9784	467.4258	261.0689	123.8061	0.0000	0.0000	0.0000	0.0000	275.4592	489.2120	690.3780	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	697.7213	549.9784	467.4258	261.0689	123.8061	0.0000	0.0000	0.0000	0.0000	275.4592	489.2120	690.3780	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(64)	
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)	
Fuel for water heating, kWh/month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)	
Lighting	15.7378	12.6255	11.3678	8.3286	6.4332	5.2560	5.8686	7.6282	9.9083	13.0002	14.6837	16.1752	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													3555.0496	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													100.0000	(216)
Water heating fuel used													714.8217	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													0.0000	(231)
Electricity for lighting (calculated in Appendix L)													127.0133	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													4880.7352	(238)

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3555.0496	0.1549	550.7816	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	714.8217	0.1416	101.2023	(264)
Energy for instantaneous electric shower(s)	483.8505	0.1391	67.3143	(264a)
Space and water heating			651.9839	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	127.0133	0.1443	18.3319	(268)

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Total CO2, kg/year  
EPC Dwelling Carbon Dioxide Emission Rate (DER)

737.6302 (272)  
14.4300 (273)

## 13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3555.0496	1.5736	5594.1730 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	714.8217	1.5235	1089.0543 (278)
Energy for instantaneous electric shower(s)	483.8505	1.5143	732.7114 (278a)
Space and water heating			6683.2273 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	127.0133	1.5338	194.8172 (282)
Total Primary energy kWh/year			7610.7559 (286)
Dwelling Primary energy Rate (DPER)			148.8500 (287)

## SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF FABRIC ENERGY EFFICIENCY

### 1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.1300 (1b)	2.5000 (2b)	127.8250 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(5)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 127.8250 (5)

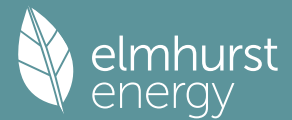
### 2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1565 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.9065	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7705 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000	(22)
Wind factor	Jan 1.2750 Feb 1.2500 Mar 1.2250 Apr 1.1000 May 1.0750 Jun 0.9500 Jul 0.9500 Aug 0.9250 Sep 1.0000 Oct 1.0750 Nov 1.1250 Dec 1.1750	(22a)
Adj infilt rate	0.9824 0.9631 0.9439 0.8475 0.8283 0.7320 0.7320 0.7127 0.7705 0.8283 0.8668	0.9053 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)		0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =		0.0000 (23c)
Effective ac	0.9825 0.9638 0.9454 0.8592 0.8430 0.7679 0.7679 0.7540 0.7968 0.8430 0.8757	0.9098 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Glazing			12.0500	1.3258	15.9754		(27)
Door			1.9500	1.4000	2.7300		(26)
External Wall	41.4450	12.0500	29.3950	0.3000	8.8185		(29a)
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)
External Roof 1	51.1300		51.1300	0.1600	8.1808		(30)
Total net area of external elements Aum(A, m2)			95.7050				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		35.9053		(33)
Main dwelling							
Party Floor 1			51.1300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.1410 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 55.0463 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	Jan 41.4456 Feb 40.6552 Mar 39.8804 Apr 36.2415 May 35.5607 Jun 32.3913 Jul 32.3913 Aug 31.8044 Sep 33.6121 Oct 35.5607 Nov 36.9380 Dec 38.3779						(38)
Heat transfer coeff	96.4918 95.7014 94.9267 91.2878 90.6070 87.4376 87.4376 86.8507 88.6584 90.6070 91.9843						93.4242 (39)
Average = Sum(39)m / 12 =							91.2845

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.8872	1.8717	1.8566	1.7854	1.7721	1.7101	1.7101	1.6986	1.7340	1.7721	1.7990	1.8272 (40)
HLP (average)												1.7853
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

## 4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7234 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869 (42b)
Hot water usage for other uses	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794 (42c)
Average daily hot water use (litres/day)												50.6367 (43)
Daily hot water use	55.2440	53.7291	52.0750	50.0157	48.1788	46.2697	45.8726	47.5233	49.2164	51.1769	53.2545	55.1663 (44)
Energy content (annual)	87.4929	76.5095	80.0374	68.4690	64.8579	56.8941	55.4789	58.8438	60.6887	69.4466	75.8708	86.3771 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (64)
12Total per year (kWh/year)												714.8217 (64)
Electric shower(s)	42.5365	37.9004	41.3858	39.4939	40.2350	38.3803	39.6597	40.2350	39.4939	41.3858	40.6076	42.5365 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.8505 (64a)
Heat gains from water heating, kWh/month	29.2264	25.7334	27.3544	24.4231	23.8411	21.6851	21.7042	22.5631	22.7698	25.1039	26.2744	28.9893 (65)

## 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	75.7427	83.8579	75.7427	78.2674	75.7427	78.2674	75.7427	75.7427	78.2674	75.7427	78.2674	75.7427 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1683	151.7266	147.7998	139.4401	128.8874	118.9694	112.3436	110.7853	114.7121	123.0719	133.6245	143.5425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	39.2828	38.2937	36.7667	33.9210	32.0444	30.1181	29.1723	30.3267	31.6248	33.7417	36.4923	38.9641 (72)
Total internal gains	314.0448	322.7293	309.1602	300.4796	285.5256	276.2061	266.1096	265.7058	273.4554	281.4073	297.2353	307.1003 (73)

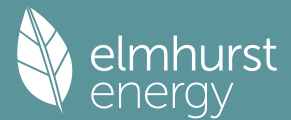
## 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
East	12.0500	19.6403	0.5500	0.9000	0.7700	81.1844 (76)						
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621 (83)
Total gains	395.2292	481.5433	570.7042	681.9259	753.0024	754.7518	721.7047	657.0552	577.6419	469.8535	398.4627	373.8624 (84)

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	36.7979	37.1018	37.4046	38.8956	39.1879	40.6083	40.6083	40.8828	40.0492	39.1879	38.6011	38.0062
alpha	3.4532	3.4735	3.4936	3.5930	3.6125	3.7072	3.7072	3.7255	3.6699	3.6125	3.5734	3.5337
util living area	0.9941	0.9878	0.9725	0.9241	0.8249	0.6577	0.5076	0.5668	0.8078	0.9577	0.9893	0.9952 (86)
MIT	18.7477	19.0264	19.4741	20.1085	20.5829	20.8798	20.9650	20.9483	20.7250	20.0729	19.3418	18.7651 (87)
Th 2	19.4096	19.4202	19.4307	19.4802	19.4896	19.5336	19.5336	19.5418	19.5166	19.4896	19.4707	19.4510 (88)
util rest of house	0.9919	0.9834	0.9619	0.8945	0.7572	0.5384	0.3504	0.4060	0.7082	0.9352	0.9846	0.9935 (89)
MIT 2	17.4394	17.7228	18.1704	18.8116	19.2342	19.4860	19.5268	19.5301	19.3817	18.8002	18.0728	17.4850 (90)
Living area fraction												0.6374 (91)
MIT	18.2733	18.5537	19.0014	19.6382	20.0939	20.3744	20.4435	20.4341	20.2379	19.6114	18.8817	18.3009 (92)
Temperature adjustment												0.0000
adjusted MIT	18.2733	18.5537	19.0014	19.6382	20.0939	20.3744	20.4435	20.4341	20.2379	19.6114	18.8817	18.3009 (93)

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## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9897	0.9801	0.9582	0.8981	0.7871	0.6102	0.4506	0.5080	0.7618	0.9374	0.9821	0.9916	(94)
Useful gains	391.1771	471.9458	546.8593	612.4698	592.6759	460.5642	325.2077	333.8009	440.0591	440.4591	391.3332	370.7273	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1348.3112	1306.6778	1186.7159	980.2687	760.5425	504.8990	336.0656	350.3614	544.1788	816.4947	1083.7279	1317.3695	(97)
Space heating kWh	712.1078	560.9399	476.0533	264.8152	124.8927	0.0000	0.0000	0.0000	0.0000	279.7705	498.5241	704.3018	(98a)
Space heating requirement - total per year (kWh/year)												3621.4054	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	712.1078	560.9399	476.0533	264.8152	124.8927	0.0000	0.0000	0.0000	0.0000	279.7705	498.5241	704.3018	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3621.4054	
Space heating per m2												70.8274	(99)

## 8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	821.9134	647.0382	660.0651	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8029	0.8689	0.8328	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	659.9131	562.2120	549.6934	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	855.1827	818.0558	743.9393	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	140.5941	190.3479	144.5190	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	35.1485	47.5870	36.1297	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												118.8652	(107)
Energy for space heating												70.8274	(99)
Energy for space cooling												2.3248	(108)
Total												73.1522	(109)
Fabric Energy Efficiency (DFEE)												73.2	(109)

## SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF ENERGY RATING

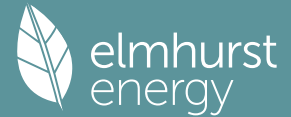
### 1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)	
Ground floor			(4)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	127.8250 (5)	

### 2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1565 (8)	
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000 (17)	
Infiltration rate		0.9065 (18)	
Number of sides sheltered		2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7705 (21)	
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)		
Wind factor	Jan 1.2750 Feb 1.2500 Mar 1.2250 Apr 1.1000 May 1.0750 Jun 0.9500 Jul 0.9500 Aug 0.9250 Sep 1.0000 Oct 1.0750 Nov 1.1250 Dec 1.1750 (22a)		
Adj infilt rate	Jan 0.9824 Feb 0.9631 Mar 0.9439 Apr 0.8475 May 0.8283 Jun 0.7320 Jul 0.7320 Aug 0.7127 Sep 0.7705 Oct 0.8283 Nov 0.8668 Dec 0.9053 (22b)		
Effective ac	Jan 0.9825 Feb 0.9638 Mar 0.9454 Apr 0.8592 May 0.8430 Jun 0.7679 Jul 0.7679 Aug 0.7540 Sep 0.7968 Oct 0.8430 Nov 0.8757 Dec 0.9098 (25)		

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### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Glazing			12.0500	1.3258	15.9754		(27)					
Door			1.9500	1.4000	2.7300		(26)					
External Wall	41.4450	12.0500	29.3950	0.3000	8.8185		(29a)					
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)					
External Roof 1	51.1300		51.1300	0.1600	8.1808		(30)					
Total net area of external elements Aum(A, m2)			95.7050				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.9053	(33)					
Main dwelling												
Party Floor 1			51.1300				(32d)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							19.1410 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	55.0463 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	41.4456	40.6552	39.8804	36.2415	35.5607	32.3913	32.3913	31.8044	33.6121	35.5607	36.9380	38.3779
Average = Sum(39)m / 12 =	96.4918	95.7014	94.9267	91.2878	90.6070	87.4376	87.4376	86.8507	88.6584	90.6070	91.9843	93.4242
HLP	1.8872	1.8717	1.8566	1.7854	1.7721	1.7101	1.7101	1.6986	1.7340	1.7721	1.7990	1.8272
HLP (average)												1.7853
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

### 4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.7234 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hot water usage for baths	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869
Hot water usage for other uses	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794
Average daily hot water use (litres/day)												50.6367 (43)
Daily hot water use	55.2440	53.7291	52.0750	50.0157	48.1788	46.2697	45.8726	47.5233	49.2164	51.1769	53.2545	55.1663
Energy conte	87.4929	76.5095	80.0374	68.4690	64.8579	56.8941	55.4789	58.8438	60.6887	69.4466	75.8708	86.3771
Energy content (annual)												840.9668
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206
Electric shower(s)	42.5365	37.9004	41.3858	39.4939	40.2350	38.3803	39.6597	40.2350	39.4939	41.3858	40.6076	42.5365
Heat gains from water heating, kWh/month	29.2264	25.7334	27.3544	24.4231	23.8411	21.6851	21.7042	22.5631	22.7698	25.1039	26.2744	28.9893
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												483.8505 (64a)

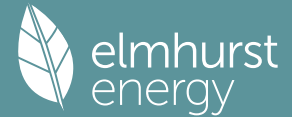
### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9800	15.9697	12.9874	9.8323	7.3498	6.2050	6.7047	8.7150	11.6973	14.8524	17.3350	18.4798
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362
Water heating gains (Table 5)	39.2828	38.2937	36.7667	33.9210	32.0444	30.1181	29.1723	30.3267	31.6248	33.7417	36.4923	38.9641
Total internal gains	362.9265	362.2529	351.8827	333.4048	313.2955	295.4214	285.0860	285.9249	296.0662	313.8154	334.7987	353.2183

### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
East	12.0500	19.6403	0.5500	0.9000	0.7700	81.1844 (76)						
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621
Total gains	444.1110	521.0669	613.4267	714.8511	780.7723	773.9671	740.6810	677.2743	600.2527	502.2616	436.0262	419.9804

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## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	36.7979	37.1018	37.4046	38.8956	39.1879	40.6083	40.6083	40.8828	40.0492	39.1879	38.6011	38.0062
alpha	3.4532	3.4735	3.4936	3.5930	3.6125	3.7072	3.7072	3.7255	3.6699	3.6125	3.5734	3.5337
util living area	0.9915	0.9846	0.9662	0.9145	0.8120	0.6461	0.4964	0.5530	0.7933	0.9491	0.9858	0.9930 (86)
MIT	18.8354	19.0956	19.5442	20.1529	20.6071	20.8868	20.9675	20.9524	20.7431	20.1232	19.4087	18.8491 (87)
Th 2	19.4096	19.4202	19.4307	19.4802	19.4896	19.5336	19.5336	19.5418	19.5166	19.4896	19.4707	19.4510 (88)
util rest of house	0.9885	0.9790	0.9536	0.8823	0.7421	0.5272	0.3418	0.3946	0.6910	0.9229	0.9797	0.9906 (89)
MIT 2	16.9928	17.3291	17.8993	18.6722	19.1841	19.4766	19.5255	19.5282	19.3575	18.6634	17.7608	17.0351 (90)
Living area fraction	FLA = Living area / (4) =											0.6374 (91)
MIT	18.1673	18.4550	18.9477	19.6160	20.0911	20.3754	20.4446	20.4359	20.2406	19.5938	18.8111	18.1913 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1673	18.4550	18.9477	19.6160	20.0911	20.3754	20.4446	20.4359	20.2406	19.5938	18.8111	18.1913 (93)

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9851	0.9744	0.9486	0.8857	0.7727	0.5987	0.4403	0.4951	0.7460	0.9252	0.9761	0.9876 (94)
Useful gains	437.4813	507.7222	581.9106	633.1505	603.2813	463.3716	326.1034	335.3091	447.7617	464.6873	425.6134	414.7925 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1338.0799	1297.2365	1181.6207	978.2363	760.2935	504.9906	336.1648	350.5237	544.4190	814.9051	1077.2401	1307.1269 (97)
Space heating kWh	670.0454	530.5536	446.1844	248.4618	116.8171	0.0000	0.0000	0.0000	0.0000	260.5621	469.1712	663.8968 (98a)
Space heating requirement - total per year (kWh/year)												3405.6924
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	670.0454	530.5536	446.1844	248.4618	116.8171	0.0000	0.0000	0.0000	0.0000	260.5621	469.1712	663.8968 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3405.6924
Space heating per m2												(98c) / (4) = 66.6085 (99)

## 9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	670.0454	530.5536	446.1844	248.4618	116.8171	0.0000	0.0000	0.0000	0.0000	260.5621	469.1712	663.8968 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	670.0454	530.5536	446.1844	248.4618	116.8171	0.0000	0.0000	0.0000	0.0000	260.5621	469.1712	663.8968 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	15.7378	12.6255	11.3678	8.3286	6.4332	5.2560	5.8686	7.6282	9.9083	13.0002	14.6837	16.1752 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3405.6924 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												714.8217 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												127.0133 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4731.3779	(238)

## 10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3405.6924	16.4900	561.5987 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	714.8217	16.4900	117.8741 (247)
Energy for instantaneous electric shower(s)	483.8505	16.4900	79.7870 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	127.0133	16.4900	20.9445 (250)
Additional standing charges			0.0000 (251)
Total energy cost			780.2042 (255)

## 11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.9218 (257)
SAP value		52.6375
SAP rating (Section 12)		53 (258)
SAP band		E

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3405.6924	0.1550	527.8186 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	714.8217	0.1416	101.2023 (264)
Energy for instantaneous electric shower(s)	483.8505	0.1391	67.3143 (264a)
Space and water heating			629.0209 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	127.0133	0.1443	18.3319 (268)
Total CO2, kg/year			714.6671 (272)
CO2 emissions per m2			13.9800 (273)
EI value			90.0379
EI rating			90 (274)
EI band			B

## SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

### 1. Overall dwelling characteristics

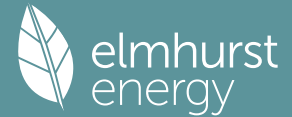
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	127.8250 (5)

### 2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	$= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =$	20.0000 / (5) = 0.1565 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.9065 (18)
Number of sides sheltered		2 (19)
Shelter factor	$(20) = 1 - [0.075 \times (19)] =$	0.8500 (20)
Infiltration rate adjusted to include shelter factor	$(21) = (18) \times (20) =$	0.7705 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)

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Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infiltr rate	0.9246	0.8668	0.8475	0.7512	0.7512	0.6934	0.7127	0.6742	0.7127	0.7705	0.7898	0.8475 (22b)
Effective ac	0.9274	0.8757	0.8592	0.7822	0.7822	0.7404	0.7540	0.7273	0.7540	0.7968	0.8119	0.8592 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Glazing			12.0500	1.3258	15.9754		(27)
Door			1.9500	1.4000	2.7300		(26)
External Wall	41.4450	12.0500	29.3950	0.3000	8.8185		(29a)
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)
External Roof 1	51.1300		51.1300	0.1600	8.1808		(30)
Total net area of external elements Aum(A, m2)			95.7050				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.9053	(33)
Main dwelling							
Party Floor 1			51.1300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.1410 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	55.0463 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	39.1213	36.9380	36.2415	32.9939	32.9939	31.2331	31.8044	30.6775	31.8044	33.6121	34.2460	36.2415 (38)
Average = Sum(39)m / 12 =	94.1676	91.9843	91.2878	88.0402	88.0402	86.2794	86.8507	85.7238	86.8507	88.6584	89.2923	91.2878 (39)
HLP	1.8417	1.7990	1.7854	1.7219	1.7219	1.6875	1.6986	1.6766	1.6986	1.7340	1.7464	1.7854 (40)
HLP (average)												1.7414
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

### 4. Water heating energy requirements (kWh/year)

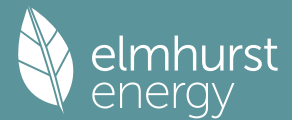
Assumed occupancy												1.7234 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869 (42b)
Hot water usage for other uses	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794 (42c)
Average daily hot water use (litres/day)												50.6367 (43)
Daily hot water use	55.2440	53.7291	52.0750	50.0157	48.1788	46.2697	45.8726	47.5233	49.2164	51.1769	53.2545	55.1663 (44)
Energy conte	87.4929	76.5095	80.0374	68.4690	64.8579	56.8941	55.4789	58.8438	60.6887	69.4466	75.8708	86.3771 (45)
Energy content (annual)												840.9668
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (64)
Electric shower(s)	42.5365	37.9004	41.3858	39.4939	40.2350	38.3803	39.6597	40.2350	39.4939	41.3858	40.6076	42.5365 (64a)
Heat gains from water heating, kWh/month	29.2264	25.7334	27.3544	24.4231	23.8411	21.6851	21.7042	22.5631	22.7698	25.1039	26.2744	28.9893 (65)

### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9800	15.9697	12.9874	9.8323	7.3498	6.2050	6.7047	8.7150	11.6973	14.8524	17.3350	18.4798 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	39.2828	38.2937	36.7667	33.9210	32.0444	30.1181	29.1723	30.3267	31.6248	33.7417	36.4923	38.9641 (72)
Total internal gains	362.9265	362.2529	351.8827	333.4048	313.2955	295.4214	285.0860	285.9249	296.0662	313.8154	334.7987	353.2183 (73)

### 6. Solar gains

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[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
East			12.0500	23.7288	0.5500	0.9000	0.7700	98.0847 (76)				
Solar gains	98.0847	170.5150	279.0239	426.9369	501.3956	547.9057	515.8583	448.5072	346.8184	216.2010	123.4914	78.0013 (83)
Total gains	461.0112	532.7680	630.9066	760.3417	814.6910	843.3271	800.9443	734.4322	642.8845	530.0165	458.2901	431.2196 (84)
7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	37.7061	38.6011	38.8956	40.3304	40.3304	41.1534	40.8828	41.4202	40.8828	40.0492	39.7649	38.8956
alpha	3.5137	3.5734	3.5930	3.6887	3.6887	3.7436	3.7255	3.7613	3.7255	3.6699	3.6510	3.5930
util living area	0.9891	0.9816	0.9574	0.8828	0.7471	0.5402	0.3831	0.4001	0.6990	0.9192	0.9789	0.9908 (86)
MIT	19.0437	19.2901	19.7507	20.3521	20.7515	20.9473	20.9889	20.9881	20.8633	20.3607	19.6701	19.0926 (87)
Th 2	19.4409	19.4707	19.4802	19.5252	19.5252	19.5498	19.5418	19.5577	19.5418	19.5166	19.5078	19.4802 (88)
util rest of house	0.9851	0.9749	0.9416	0.8411	0.6614	0.4145	0.2315	0.2393	0.5709	0.8769	0.9695	0.9874 (89)
MIT 2	17.2769	17.6064	18.1876	18.9329	19.3525	19.5290	19.5403	19.5561	19.4747	18.9616	18.1141	17.3636 (90)
Living area fraction	18.4030	18.6796	19.1839	19.8375	20.2442	20.4330	20.4637	20.4689	20.3598	19.8534	19.1058	18.4656 (91)
MIT	18.4030	18.6796	19.1839	19.8375	20.2442	20.4330	20.4637	20.4689	20.3598	19.8534	19.1058	18.4656 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4030	18.6796	19.1839	19.8375	20.2442	20.4330	20.4637	20.4689	20.3598	19.8534	19.1058	18.4656 (93)
8. Space heating requirement												
Utilisation	0.9814	0.9703	0.9377	0.8512	0.7061	0.4932	0.3285	0.3423	0.6474	0.8884	0.9661	0.9841 (94)
Useful gains	452.4201	516.9239	591.6130	647.1702	575.2401	415.9023	263.1363	251.3946	416.2012	470.8516	442.7474	424.3638 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	1262.1327	1221.5109	1103.1130	910.1140	672.9986	434.2456	266.0810	254.5030	465.5006	722.8665	982.7370	1210.9886 (97)
Space heating kWh	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488 (98a)
Space heating requirement - total per year (kWh/year)												2880.0569
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2880.0569
Space heating per m2										(98c) / (4) =		56.3281 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	15.7378	12.6255	11.3678	8.3286	6.4332	5.2560	5.8686	7.6282	9.9083	13.0002	14.6837	16.1752 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2880.0569 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	100.0000	
Water heating fuel used	714.8217	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	127.0133	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4205.7425	(238)

## 10a. Fuel costs - using BEDF prices (574)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2880.0569	28.4300	818.8002	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	714.8217	28.4300	203.2238	(247)
Energy for instantaneous electric shower(s)	483.8505	28.4300	137.5587	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	127.0133	28.4300	36.1099	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1195.6926	(255)

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2880.0569	0.1557	448.4542	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	714.8217	0.1416	101.2023	(264)
Energy for instantaneous electric shower(s)	483.8505	0.1391	67.3143	(264a)
Space and water heating			549.6565	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	127.0133	0.1443	18.3319	(268)
Total CO2, kg/year			635.3028	(272)

## 13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2880.0569	1.5765	4540.3444	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	714.8217	1.5235	1089.0543	(278)
Energy for instantaneous electric shower(s)	483.8505	1.5143	732.7114	(278a)
Space and water heating			5629.3988	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	127.0133	1.5338	194.8172	(282)
Total Primary energy kWh/year			6556.9274	(286)

## SAP 10 EPC IMPROVEMENTS

### New Unit - Baseline

Current energy efficiency rating:	E 53
Current environmental impact rating:	B 90

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

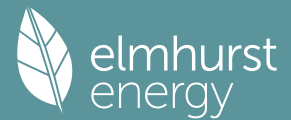
Potential energy efficiency rating:	E 53
Potential environmental impact rating:	B 90

Fuel prices for cost data on this page from database revision number 574 TEST (30 Jun 2025)  
 Recommendation texts revision number 6.1 (11 Jun 2019)

### Typical heating and lighting costs of this home (per year, South East England):

	Current	Potential	Saving
Electricity	£1196	£1196	£0
Space heating	£819	£819	£0
Water heating	£341	£341	£0
Lighting	£36	£36	£0
Total cost of fuels	£1196	£1196	£0
Total cost of uses	£1196	£1196	£0
Delivered energy	82 kWh/m²	82 kWh/m²	0 kWh/m²

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Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m <sup>2</sup>	12 kg/m <sup>2</sup>	12 kg/m <sup>2</sup>	0 kg/m <sup>2</sup>
Primary energy	128 kWh/m <sup>2</sup>	128 kWh/m <sup>2</sup>	0 kWh/m <sup>2</sup>

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)  
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

## 1. Overall dwelling characteristics

Main dwelling		Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor		51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.8250 (5)

## 2. Ventilation rate

			m <sup>3</sup> per hour
Number of open chimneys	0 * 80 =		0.0000 (6a)
Number of open flues	0 * 20 =		0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =		0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =		0.0000 (6d)
Number of flues attached to other heater	0 * 35 =		0.0000 (6e)
Number of blocked chimneys	0 * 20 =		0.0000 (6f)
Number of intermittent extract fans	2 * 10 =		20.0000 (7a)
Number of passive vents	0 * 10 =		0.0000 (7b)
Number of flueless gas fires	0 * 40 =		0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)		20.0000 / (5) =	0.1565 (8)
Pressure test			No
Pressure Test Method			Blower Door
Measured/design AP50			15.0000 (17)
Infiltration rate			0.9065 (18)
Number of sides sheltered			2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.7705 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9824	0.9631	0.9439	0.8475	0.8283	0.7320	0.7320	0.7127	0.7705	0.8283	0.8668	0.9053 (22b)
Effective ac	0.9825	0.9638	0.9454	0.8592	0.8430	0.7679	0.7679	0.7540	0.7968	0.8430	0.8757	0.9098 (25)

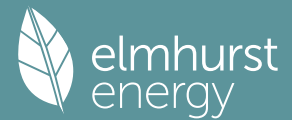
## 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K					
Main dwelling												
Glazing			12.0500	1.3258	15.9754		(27)					
Door			1.9500	1.4000	2.7300		(26)					
External Wall	41.4450	12.0500	29.3950	0.3000	8.8185		(29a)					
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)					
External Roof 1	51.1300		51.1300	0.1600	8.1808		(30)					
Total net area of external elements Aum(A, m <sup>2</sup> )			95.7050				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.9053	(33)					
Main dwelling												
Party Floor 1			51.1300				(32d)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							250.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							19.1410 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	55.0463 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	41.4456	40.6552	39.8804	36.2415	35.5607	32.3913	32.3913	31.8044	33.6121	35.5607	36.9380	38.3779 (38)
Heat transfer coeff	96.4918	95.7014	94.9267	91.2878	90.6070	87.4376	87.4376	86.8507	88.6584	90.6070	91.9843	93.4242 (39)
Average = Sum(39)m / 12 =												91.2845
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.8872	1.8717	1.8566	1.7854	1.7721	1.7101	1.7101	1.6986	1.7340	1.7721	1.7990	1.8272 (40)
HLP (average)												1.7853
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

## 4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7234 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869 (42b)
Hot water usage for other uses												

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	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794 (42c)
Average daily hot water use (litres/day)	50.6367 (43)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	55.2440	53.7291	52.0750	50.0157	48.1788	46.2697	45.8726	47.5233	49.2164	51.1769	53.2545	55.1663 (44)
Energy content (annual)	87.4929	76.5095	80.0374	68.4690	64.8579	56.8941	55.4789	58.8438	60.6887	69.4466	75.8708	86.3771 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:	Total = Sum(45)m = 840.9668											
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (64)
Electric shower(s)	42.5365	37.9004	41.3858	39.4939	40.2350	38.3803	39.6597	40.2350	39.4939	41.3858	40.6076	42.5365 (64a)
Heat gains from water heating, kWh/month	29.2264	25.7334	27.3544	24.4231	23.8411	21.6851	21.7042	22.5631	22.7698	25.1039	26.2744	28.9893 (65)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 483.8505 (64a)											

## 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9800	15.9697	12.9874	9.8323	7.3498	6.2050	6.7047	8.7150	11.6973	14.8524	17.3350	18.4798 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	39.2828	38.2937	36.7667	33.9210	32.0444	30.1181	29.1723	30.3267	31.6248	33.7417	36.4923	38.9641 (72)
Total internal gains	362.9265	362.2529	351.8827	333.4048	313.2955	295.4214	285.0860	285.9249	296.0662	313.8154	334.7987	353.2183 (73)

## 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
East	12.0500	19.6403	0.5500	0.9000	0.7700	81.1844 (76)						
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621 (83)
Total gains	444.1110	521.0669	613.4267	714.8511	780.7723	773.9671	740.6810	677.2743	600.2527	502.2616	436.0262	419.9804 (84)

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9915	0.9846	0.9662	0.9145	0.8120	0.6461	0.4964	0.5530	0.7933	0.9491	0.9858	0.9930 (86)
tau	36.7979	37.1018	37.4046	38.8956	39.1879	40.6083	40.6083	40.8828	40.0492	39.1879	38.6011	38.0062
alpha	3.4532	3.4735	3.4936	3.5930	3.6125	3.7072	3.7072	3.7255	3.6699	3.6125	3.5734	3.5337
util living area	0.9915	0.9846	0.9662	0.9145	0.8120	0.6461	0.4964	0.5530	0.7933	0.9491	0.9858	0.9930 (86)
MIT	18.8354	19.0956	19.5442	20.1529	20.6071	20.8868	20.9675	20.9524	20.7431	20.1232	19.4087	18.8491 (87)
Th 2	19.4096	19.4202	19.4307	19.4802	19.4896	19.5336	19.5336	19.5418	19.5166	19.4896	19.4707	19.4510 (88)
util rest of house	0.9885	0.9790	0.9536	0.8823	0.7421	0.5272	0.3418	0.3946	0.6910	0.9229	0.9797	0.9906 (89)
MIT 2	16.9928	17.3291	17.8993	18.6722	19.1841	19.4766	19.5255	19.5282	19.3575	18.6634	17.7608	17.0351 (90)
Living area fraction	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (91)
MIT	18.1673	18.4550	18.9477	19.6160	20.0911	20.3754	20.4446	20.4359	20.2406	19.5938	18.8111	18.1913 (92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (93)
adjusted MIT	18.1673	18.4550	18.9477	19.6160	20.0911	20.3754	20.4446	20.4359	20.2406	19.5938	18.8111	18.1913 (93)

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9851	0.9744	0.9486	0.8857	0.7727	0.5987	0.4403	0.4951	0.7460	0.9252	0.9761	0.9876 (94)
Useful gains	437.4813	507.7222	581.9106	633.1505	603.2813	463.3716	326.1034	335.3091	447.7617	464.6873	425.6134	414.7925 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1338.0799	1297.2365	1181.6207	978.2363	760.2935	504.9906	336.1648	350.5237	544.4190	814.9051	1077.2401	1307.1269 (97)
Space heating kWh	670.0454	530.5536	446.1844	248.4618	116.8171	0.0000	0.0000	0.0000	0.0000	260.5621	469.1712	663.8968 (98a)
Space heating requirement - total per year (kWh/year)	3405.6924											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh												

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670.0454 530.5536 446.1844 248.4618 116.8171 0.0000 0.0000 0.0000 0.0000 260.5621 469.1712 663.8968 (98c)  
 Space heating requirement after solar contribution - total per year (kWh/year) 3405.6924  
 Space heating per m2 (98c) / (4) = 66.6085 (99)

## 9a. Energy requirements - Individual heating systems, including micro-CHP

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	670.0454	530.5536	446.1844	248.4618	116.8171	0.0000	0.0000	0.0000	0.0000	260.5621	469.1712	663.8968	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	670.0454	530.5536	446.1844	248.4618	116.8171	0.0000	0.0000	0.0000	0.0000	260.5621	469.1712	663.8968	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	15.7378	12.6255	11.3678	8.3286	6.4332	5.2560	5.8686	7.6282	9.9083	13.0002	14.6837	16.1752	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													3405.6924 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													100.0000
Water heating fuel used													714.8217 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													127.0133 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													4731.3779 (238)

## 10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3405.6924	16.4900	561.5987	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	714.8217	16.4900	117.8741	(247)
Energy for instantaneous electric shower(s)	483.8505	16.4900	79.7870	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	127.0133	16.4900	20.9445	(250)
Additional standing charges			0.0000	(251)
Total energy cost			780.2042	(255)

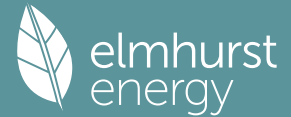
## 11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):			0.3600 (256)
Energy cost factor (ECF)		[(255) x (256)] / [(4) + 45.0] =	2.9218 (257)
SAP value			52.6375
SAP rating (Section 12)			53 (258)
SAP band			E

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

Energy Emission factor Emissions

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	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	3405.6924	0.1550	527.8186 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	714.8217	0.1416	101.2023 (264)
Energy for instantaneous electric shower(s)	483.8505	0.1391	67.3143 (264a)
Space and water heating			629.0209 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	127.0133	0.1443	18.3319 (268)
Total CO2, kg/year			714.6671 (272)
CO2 emissions per m2			13.9800 (273)
EI value			90.0379
EI rating			90 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)  
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.8250 (5)

2. Ventilation rate

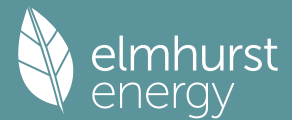
		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1565 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.9065	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7705 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9246	0.8668	0.8475	0.7512	0.7512	0.6934	0.7127	0.6742	0.7127	0.7705	0.7898	0.8475 (22b)
Effective ac	0.9274	0.8757	0.8592	0.7822	0.7822	0.7404	0.7540	0.7273	0.7540	0.7968	0.8119	0.8592 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Glazing			12.0500	1.3258	15.9754		(27)					
Door			1.9500	1.4000	2.7300		(26)					
External Wall	41.4450	12.0500	29.3950	0.3000	8.8185		(29a)					
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)					
External Roof 1	51.1300		51.1300	0.1600	8.1808		(30)					
Total net area of external elements Aum(A, m2)			95.7050				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.9053	(33)					
Main dwelling												
Party Floor 1			51.1300				(32d)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												
Thermal bridges (Default value 0.200 * total exposed area)							250.0000 (35)					
Point Thermal bridges							19.1410 (36)					
Total fabric heat loss						(33a) =	0.0000					
						(33) + (36) + (36a) =	55.0463 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	39.1213	36.9380	36.2415	32.9939	32.9939	31.2331	31.8044	30.6775	31.8044	33.6121	34.2460	36.2415 (38)
Average = Sum(39)m / 12 =	94.1676	91.9843	91.2878	88.0402	88.0402	86.2794	86.8507	85.7238	86.8507	88.6584	89.2923	91.2878 (39)
												89.0386
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.8417	1.7990	1.7854	1.7219	1.7219	1.6875	1.6986	1.6766	1.6986	1.7340	1.7464	1.7854 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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## 4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7234 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869 (42b)
Hot water usage for other uses	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794 (42c)
Average daily hot water use (litres/day)												50.6367 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	55.2440	53.7291	52.0750	50.0157	48.1788	46.2697	45.8726	47.5233	49.2164	51.1769	53.2545	55.1663 (44)
Distribution loss (46)m = 0.15 x (45)m	87.4929	76.5095	80.0374	68.4690	64.8579	56.8941	55.4789	58.8438	60.6887	69.4466	75.8708	86.3771 (45)
Water storage loss:												Total = Sum(45)m = 840.9668
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Output from w/h	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206 (64)
Electric shower(s)												Total per year (kWh/year) = Sum(64)m = 714.8217 (64)
Heat gains from water heating, kWh/month	42.5365	37.9004	41.3858	39.4939	40.2350	38.3803	39.6597	40.2350	39.4939	41.3858	40.6076	42.5365 (64a)
	29.2264	25.7334	27.3544	24.4231	23.8411	21.6851	21.7042	22.5631	22.7698	25.1039	26.2744	28.9893 (65)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 483.8505 (64a)

## 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.9800	15.9697	12.9874	9.8323	7.3498	6.2050	6.7047	8.7150	11.6973	14.8524	17.3350	18.4798 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	39.2828	38.2937	36.7667	33.9210	32.0444	30.1181	29.1723	30.3267	31.6248	33.7417	36.4923	38.9641 (72)
Total internal gains	362.9265	362.2529	351.8827	333.4048	313.2955	295.4214	285.0860	285.9249	296.0662	313.8154	334.7987	353.2183 (73)

## 6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
East	12.0500	23.7288	0.5500	0.9000	0.7700	98.0847 (76)						
Solar gains	98.0847	170.5150	279.0239	426.9369	501.3956	547.9057	515.8583	448.5072	346.8184	216.2010	123.4914	78.0013 (83)
Total gains	461.0112	532.7680	630.9066	760.3417	814.6910	843.3271	800.9443	734.4322	642.8845	530.0165	458.2901	431.2196 (84)

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	37.7061	38.6011	38.8956	40.3304	40.3304	41.1534	40.8828	41.4202	40.8828	40.0492	39.7649	38.8956
alpha	3.5137	3.5734	3.5930	3.6887	3.6887	3.7436	3.7255	3.7613	3.7255	3.6699	3.6510	3.5930
util living area	0.9891	0.9816	0.9574	0.8828	0.7471	0.5402	0.3831	0.4001	0.6990	0.9192	0.9789	0.9908 (86)
MIT	19.0437	19.2901	19.7507	20.3521	20.7515	20.9473	20.9889	20.9881	20.8633	20.3607	19.6701	19.0926 (87)
Th 2	19.4409	19.4707	19.4802	19.5252	19.5252	19.5498	19.5418	19.5577	19.5418	19.5166	19.5078	19.4802 (88)
util rest of house	0.9851	0.9749	0.9416	0.8411	0.6614	0.4145	0.2315	0.2393	0.5709	0.8769	0.9695	0.9874 (89)
MIT 2	17.2769	17.6064	18.1876	18.9329	19.3525	19.5290	19.5403	19.5561	19.4747	18.9616	18.1141	17.3636 (90)
Living area fraction	18.4030	18.6796	19.1839	19.8375	20.2442	20.4330	20.4637	20.4689	20.3598	19.8534	19.1058	18.4656 (91)
MIT	18.4030	18.6796	19.1839	19.8375	20.2442	20.4330	20.4637	20.4689	20.3598	19.8534	19.1058	18.4656 (92)
Temperature adjustment	18.4030	18.6796	19.1839	19.8375	20.2442	20.4330	20.4637	20.4689	20.3598	19.8534	19.1058	18.4656 (93)
adjusted MIT	18.4030	18.6796	19.1839	19.8375	20.2442	20.4330	20.4637	20.4689	20.3598	19.8534	19.1058	18.4656 (93)

## 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9814	0.9703	0.9377	0.8512	0.7061	0.4932	0.3285	0.3423	0.6474	0.8884	0.9661	0.9841 (94)
Ext temp.	452.4201	516.9239	591.6130	647.1702	575.2401	415.9023	263.1363	251.3946	416.2012	470.8516	442.7474	424.3638 (95)
	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)

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Heat loss rate W	1262.1327	1221.5109	1103.1130	910.1140	672.9986	434.2456	266.0810	254.5030	465.5006	722.8665	982.7370	1210.9886	(97)
Space heating kWh	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488	(98a)
Space heating requirement - total per year (kWh/year)												2880.0569	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2880.0569	
Space heating per m2												56.3281	(99)

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**9a. Energy requirements - Individual heating systems, including micro-CHP**  
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Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	602.4261	473.4824	380.5560	189.3195	72.7323	0.0000	0.0000	0.0000	0.0000	187.4991	388.7925	585.2488	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(64)	
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)	
Fuel for water heating, kWh/month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)	
Lighting	15.7378	12.6255	11.3678	8.3286	6.4332	5.2560	5.8686	7.6282	9.9083	13.0002	14.6837	16.1752	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													2880.0569	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													100.0000	
Water heating fuel used													714.8217	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													0.0000	(231)
Electricity for lighting (calculated in Appendix L)													127.0133	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													4205.7425	(238)

-----  
**10a. Fuel costs - using BEDF prices (574)**  
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	Fuel	Fuel price	Fuel cost	
	kWh/year	p/kWh	£/year	
Space heating - main system 1	2880.0569	28.4300	818.8002	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	714.8217	28.4300	203.2238	(247)
Energy for instantaneous electric shower(s)	483.8505	28.4300	137.5587	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	127.0133	28.4300	36.1099	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1195.6926	(255)

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**12a. Carbon dioxide emissions - Individual heating systems including micro-CHP**  
 -----

	Energy	Emission factor	Emissions	
	kWh/year	kg CO2/kWh	kg CO2/year	
Space heating - main system 1	2880.0569	0.1557	448.4542	(261)

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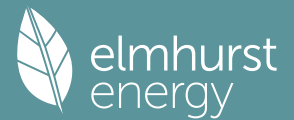


Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	714.8217	0.1416	101.2023 (264)
Energy for instantaneous electric shower(s)	483.8505	0.1391	67.3143 (264a)
Space and water heating			549.6565 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	127.0133	0.1443	18.3319 (268)
Total CO2, kg/year			635.3028 (272)

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 13a. Primary energy - Individual heating systems including micro-CHP  
 -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2880.0569	1.5765	4540.3444 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	714.8217	1.5235	1089.0543 (278)
Energy for instantaneous electric shower(s)	483.8505	1.5143	732.7114 (278a)
Space and water heating			5629.3988 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	127.0133	1.5338	194.8172 (282)
Total Primary energy kWh/year			6556.9274 (286)

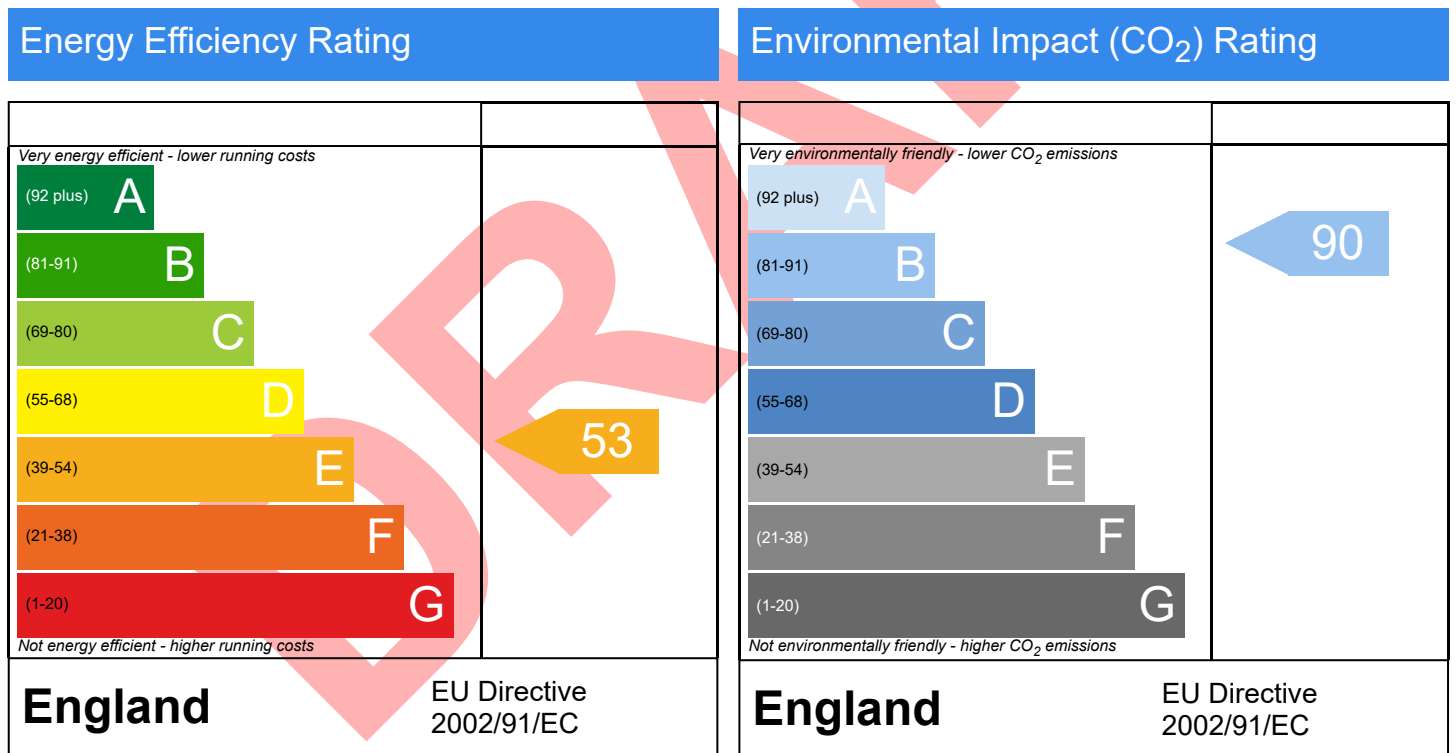
# Predicted Energy Assessment



Dwelling type: Flat, Detached  
 Date of assessment: 08/07/2025  
 Produced by: Aharon Horwich  
 Total floor area: 51.13 m<sup>2</sup>  
 DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO<sub>2</sub>) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO<sub>2</sub>) emissions. The higher the rating the less impact it has on the environment.

# Summary for Input Data



Property Reference	New Unit - Baseline		Issued on Date	08/07/2025
Assessment Reference	New Unit - Baseline	Prop Type Ref		
Property				

SAP Rating	53 E	DER	14.43	TER	
Environmental	90 B	% DER < TER			N/A
CO <sub>2</sub> Emissions (t/year)	0.64	DFEE	73.15	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	148.85	TPER	

Assessor Details	Mr. Aharon Horwich	Assessor ID	AV59-0001
Client	A, A		

## SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	West	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Detached	
Position of Flat	Mid-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	250.00	kJ/m <sup>2</sup> K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground floor:	17.83 m	51.13 m <sup>2</sup>	2.50 m

8.0 Living Area	32.59	m <sup>2</sup>
-----------------	-------	----------------

9.0 External Walls										
Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area(m <sup>2</sup> )	Nett Area (m <sup>2</sup> )	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Steel Frame	Other	0.30		41.45	29.40	0.00	None	12.05	Calculate Wall Area
Corridor Wall	Steel Frame	Other	0.18		3.13	1.18	0.50	Stairwell Access Corridor 1	1.95	Enter Gross Area

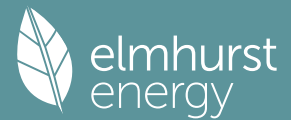
10.0 External Roofs										
Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area(m <sup>2</sup> )	Nett Area (m <sup>2</sup> )	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Other	0.16	0.00	51.13	51.13	None	0.00	Enter Gross Area	0.00

11.1 Party Floors					
Description	Storey Index	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )	
Party Floor 1	Lowest occupied	Other	0.00	51.13	

12.0 Opening Types									
Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Glazing	Manufacturer	Window	Double glazed			0.55		0.90	1.40
Door	Manufacturer	Solid Door				0.00			1.40

13.0 Openings					
Name	Opening Type	Location	Orientation	Area (m <sup>2</sup> )	Pitch

# Summary for Input Data



D W 1.95  
W E 12.05

Door  
Glazing

Corridor Wall  
External Wall

North  
East

## 14.0 Conservatory

None

## 15.0 Draught Proofing

100 %

## 16.0 Draught Lobby

No

## 17.0 Thermal Bridging

Default

## 17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		6.70			No
E4 Jamb		14.20			No
E7 Party floor between dwellings (in blocks of flats)		22.27			No
E18 Party wall between dwellings		2.50			No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)		14.05			No
E16 Corner (normal)		5.00			No
E14 Flat roof		22.27			No
P4 Party wall - Roof (insulation at ceiling level)		14.05			No

Y-value 0.20 W/m<sup>2</sup>K

## 19.0 Mechanical Ventilation

### Mechanical Ventilation

Mechanical Ventilation System Present No

## 20.0 Fans, Open Fireplaces, Flues

Number of open chimneys 0

Number of open flues 0

Number of chimneys/flues attached to closed fire 0

Number of flues attached to solid fuel boiler 0

Number of flues attached to other heater 0

Number of blocked chimneys 0

Number of intermittent extract fans 2

Number of passive vents 0

Number of flueless gas fires 0

## 21.0 Fixed Cooling System

No

## 22.0 Pressure Testing

No

Test Method

Blower Door

## 22.0 Lighting

No Fixed Lighting No

Name	Efficacy	Power	Capacity	Count
Lighting 1	80.00	10.00	800.00	10

## 24.0 Main Heating 1

Description SAP table

Percentage of Heat Elec Panel 100.00 %

Fuel Type Electricity

SAP Code 691

In Winter 100.00

In Summer 100.00

Controls SAP Code 2603

## 25.0 Main Heating 2

None

## 26.0 Heat Networks

None

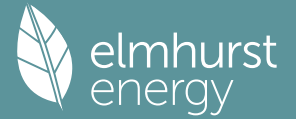
## 27.0 Secondary Heating

None

## 28.0 Water Heating

Water Heating Independent

# Summary for Input Data



SAP Code	909
Fuel Type	Electricity
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
Cold Water Source	From mains
Bath Count	1

## 28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Instantaneous electric shower		9.30	No	

## 28.3 Waste Water Heat Recovery System

### 29.0 Hot Water Cylinder

	None
In Airing Cupboard	No

### 34.0 Small-scale Hydro

	None											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

## 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
		0	0
		0	0
		0	0

Dwelling Address	
Reference	New Unit - Baseline-New Unit - Baseline
Assessment Date	07/07/2025
Submission Date	
Property Type	Flat, Detached
Total Floor Area	51

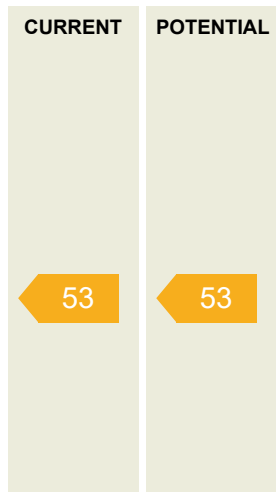
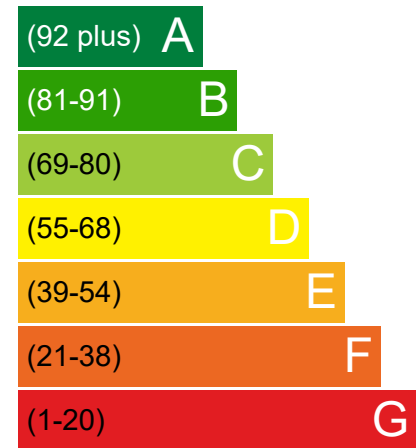
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

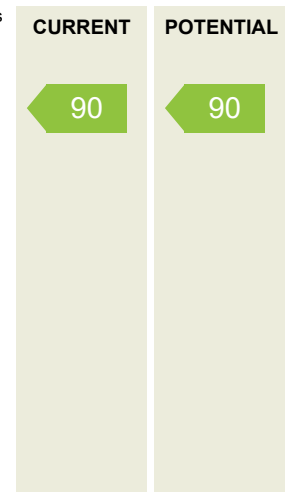
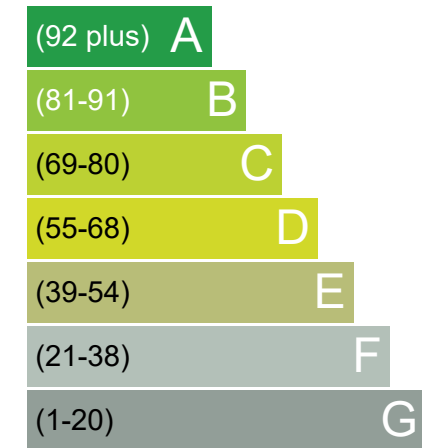
## Energy Efficiency Rating

## Carbon Dioxide (CO2) Emissions Rating

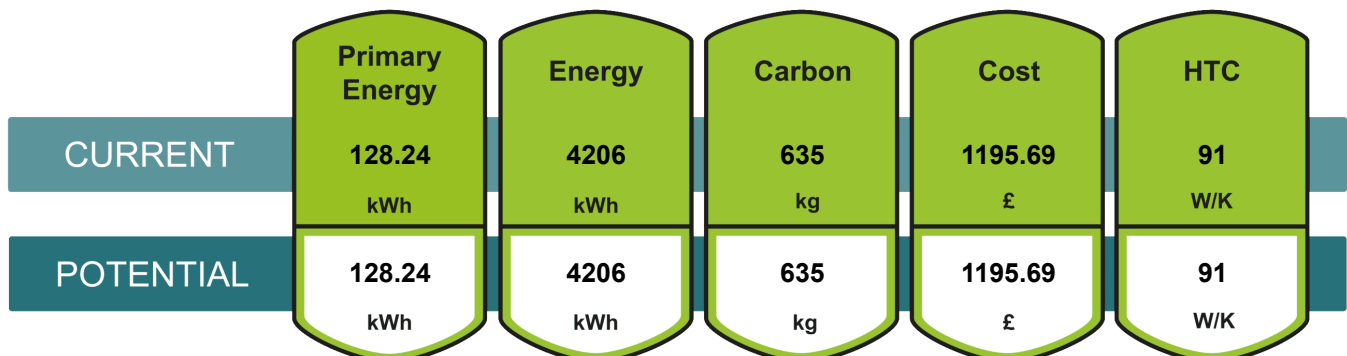
Most energy efficient - lower running costs



Very environmentally friendly - lower CO2 emissions



## Additional ratings for your home



## Breakdown of property's energy performance

Each feature is assessed as one of the following:



Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.29 W/m <sup>2</sup> K	Good
Roof	Average thermal transmittance 0.16 W/m <sup>2</sup> K	Very Good
Windows	High performance glazing	Good
Main heating	Room heaters, electric	Very Poor
Main heating controls	Programmer and appliance thermostats	Good
Secondary heating	None	
Hot water	Electric instantaneous at point of use	Very Poor
Lighting	Good lighting efficiency	Good
Air tightness	(not tested)	

## Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling. To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed. Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.


Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

## Estimated energy costs of the dwelling

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total

energy cost if all recommended measures named above were installed.

		Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting		£36	£36	
Heating		£819	£819	
Hot Water		£341	£341	
New Technologies e.g. Impact of PV		£0	£0	
<b>TOTAL</b>		<b>£1196</b>	<b>£1196</b>	

## Estimated energy use and potential savings



Space Heating

**2880**

kWh per year



Water Heating

**715**

kWh per year

## About this document

Created by:

Company/Trading name:

Phone number:

Email address:

### Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.

This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.

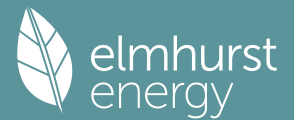
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.

The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

## Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO <sub>2</sub> )	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.

# Dwelling Sign Off Report



Property Reference	New Unit - Baseline	Issued on Date	08/07/2025
Assessment Reference	New Unit - Baseline	Prop Type Ref	Detached Flat
Property			

SAP Rating	53 E	DER	14.43	TER	
Environmental	90 B	% DER < TER			N/A
CO <sub>2</sub> Emissions (t/year)	0.64	DFEE	73.15	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	148.85	TPER	

Assessor Details	Mr. Aharon Horwich	Assessor ID	AV59-0001
Client	A, A		

This report should be used for a client to confirm key assessment details for production of Energy Performance Certificates and should be retained as documentary evidence. It cannot be used in lieu of a BREL/BRWL/Compliance report for demonstrating Building Regulation compliance.

## Section 1: Dwelling Information

**Dwelling Address** (Please confirm final postal address and post code of the dwelling.)

House Name		
House Number		
Postcode		
Street		
Town		
County		

**Dwelling Orientation**  (Please confirm orientation of main entrance door of the dwelling.)

Comments

**Terrain Type**

**Property Type**

Comments

**Electricity Tariff**

Smart electricity meter fitted

Smart gas meter fitted

Comments

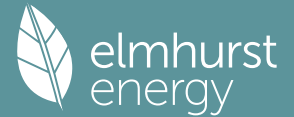
## Section 2: Dwelling Construction Details

### External Walls

Description	<input type="text" value="External Wall"/>		
Type	<input type="text" value="Steel Frame"/>		
Construction	<input type="text" value="Other"/>		
U-value	<input type="text" value="0.30"/>	W/m <sup>2</sup> K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	<input type="text" value="41.45"/>	m <sup>2</sup>	

Description	<input type="text" value="Corridor Wall"/>		
Type	<input type="text" value="Steel Frame"/>		
Construction	<input type="text" value="Other"/>		
U-value	<input type="text" value="0.18"/>	W/m <sup>2</sup> K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	<input type="text" value="3.13"/>	m <sup>2</sup>	

# Dwelling Sign Off Report



Comments

## External Roofs

Description	External Roof 1	
Type	External Flat Roof	
Construction	Other	
U-value	0.16	W/m <sup>2</sup> K U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	51.13	m <sup>2</sup>

Comments

## Opening Types

Description	Data Source	Type	Glazing	G-value	Frame Type	U-Value (W/m <sup>2</sup> K)
Glazing	Manufacturer	Window	Double glazed	0.55		1.40
Door	Manufacturer	Solid Door		0.00		1.40

Comments

## Openings

Name	Opening Type	Location	Orientation	Area (m <sup>2</sup> )
D W	Door	Corridor Wall	North	1.95
W E	Glazing	External Wall	East	12.05

Comments

## Thermal Bridging

	Default
Y-value	0.200

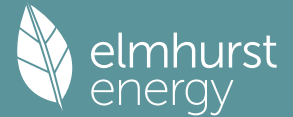
Comments

Where specific construction details have been used documentary evidence should be provided to the SAP assessor, usually in the form of signed checklists.

## Pressure Testing

	No	
Designed AP <sub>50</sub>	5.00	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

# Dwelling Sign Off Report



Where an air pressure test has been carried out a copy of the test certificate should be forwarded to the SAP assessor.

Comments

## Section 3: Dwelling Systems

### Fans, Open Fireplaces, Flues

Number of open chimneys	<input type="text" value="0"/>
Number of open flues	<input type="text" value="0"/>
Number of chimneys/flues attached to closed fire	<input type="text" value="0"/>
Number of flues attached to solid fuel boiler	<input type="text" value="0"/>
Number of flues attached to other heater	<input type="text" value="0"/>
Number of blocked chimneys	<input type="text" value="0"/>
Number of intermittent extract fans	<input type="text" value="2"/>
Number of passive vents	<input type="text" value="0"/>
Number of flueless gas fires	<input type="text" value="0"/>

Comments

### Fixed Cooling System

Comments

### Lighting

No Fixed Lighting

Name	Efficacy (lm/W)	Power (W)	Capacity (lm)	Count
Lighting 1	80.00	10.00	800.00	10

Comments

### Main Heating 1

	<input type="text" value="SAP table"/>	
Fuel Type	<input type="text" value="Electricity"/>	
Winter Efficiency	<input type="text" value="100.00"/>	%
Summer Efficiency	<input type="text" value="100.00"/>	%
Model Name	<input type="text"/>	
Manufacturer	<input type="text"/>	
System Type	<input type="text"/>	
Flue Type	<input type="text"/>	
Fan Assisted Flue	<input type="text" value="No"/>	
Heat Emitter	<input type="text"/>	

# Dwelling Sign Off Report



Flow Temperature

Flow Temperature Value

Comments

## Heating Controls

Description

Boiler Interlock

Delayed Start Stat

PCDF Control Description

Comments

**Main Heating 2**

**Secondary Heating**

## Water Heating System

Water Heating

Supplementary Immersion

SAP Code

Water use <= 125 l/p/day

Cold Water Source

Number of baths

Comments

**Hot Water Cylinder**

Comments

## Showers

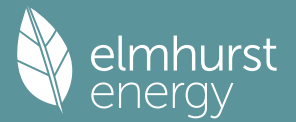
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Instantaneous electric shower	7.00	9.30	No	

Comments

## Waste Water Heat Recovery System

Comments

# Dwelling Sign Off Report



## Section 4: Dwelling Renewable Energy

**Photovoltaic Unit**

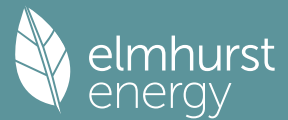
## Section 5: Declaration

I confirm to the best of my knowledge the details provided in this report are an accurate representation of how the dwelling has been constructed.

Signed .....

Date .....

# Full SAP Calculation Printout



Property Reference	New Unit		Issued on Date	08/07/2025	
Assessment Reference	New Unit - Be Green Dimplex	Prop Type Ref			
Property					
SAP Rating	71 C	DER	8.96	TER	
Environmental	94 A	% DER < TER	N/A		
CO <sub>2</sub> Emissions (t/year)	0.39	DFEE	51.99	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	91.87	TPER	
Assessor Details	Mr. Aharon Horwich			Assessor ID	AV59-0001
Client	A, A				

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)  
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

Main dwelling	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.8250 (5)

2. Ventilation rate

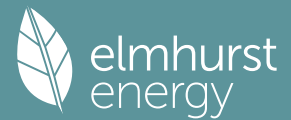
		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) =	0.1565 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4065	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3455 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4405	0.4319	0.4232	0.3800	0.3714	0.3282	0.3282	0.3196	0.3455	0.3714	0.3887	0.4060 (22b)
Effective ac	0.5970	0.5933	0.5896	0.5722	0.5690	0.5539	0.5539	0.5511	0.5597	0.5690	0.5755	0.5824 (25)

3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K					
Main dwelling												
Glazing			12.0500	1.2357	14.8907		(27)					
Door			1.9500	1.3000	2.5350		(26)					
External Wall	41.4450	12.0500	29.3950	0.1800	5.2911		(29a)					
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)					
External Roof 1	49.9000		49.9000	0.1400	6.9860		(30)					
Total net area of external elements Aum(A, m <sup>2</sup> )			94.4750				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.9034	(33)					
Main dwelling												
Party Floor 1			51.1300				(32d)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							250.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							18.8950 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	48.7984 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	25.1838	25.0248	24.8691	24.1374	24.0005	23.3632	23.3632	23.2452	23.6087	24.0005	24.2774	24.5669 (38)
Heat transfer coeff	73.9821	73.8232	73.6674	72.9358	72.7989	72.1616	72.1616	72.0436	72.4071	72.7989	73.0758	73.3653 (39)

# Full SAP Calculation Printout



Average = Sum(39)m / 12 =

72.9351

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.4469	1.4438	1.4408	1.4265	1.4238	1.4113	1.4113	1.4090	1.4161	1.4238	1.4292	1.4349 (40)
HLP (average)												1.4265
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

#### 4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.7234 (42)
Hot water usage for mixer showers												46.2978 (42a)
Hot water usage for baths												22.8869 (42b)
Hot water usage for other uses												32.2794 (42c)
Average daily hot water use (litres/day)												93.4859 (43)
Daily hot water use	101.7199	99.5066	96.8347	92.8281	89.5541	86.0425	84.7344	87.3952	90.1955	93.8767	97.9434	101.4642 (44)
Energy content (annual)	161.0994	141.6960	148.8314	127.0770	120.5571	105.7992	102.4789	108.2135	111.2200	127.3898	139.5384	158.8684 (45)
Distribution loss (46)m = 0.15 x (45)m												1552.7691
Water storage loss:												23.8303 (46)
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												26.9514 (56)
If cylinder contains dedicated solar storage												26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198 (64)
12Total per year (kWh/year)												1870.1001 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	53.5656	47.1139	49.4864	42.2531	40.0852	35.1782	34.0742	35.9810	36.9807	42.3571	46.3965	52.8237 (65)

#### 5. Internal gains (see Table 5 and 5a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts												
(66)m	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	75.7427	83.8579	75.7427	78.2674	75.7427	78.2674	75.7427	75.7427	78.2674	75.7427	78.2674	75.7427 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1683	151.7266	147.7998	139.4401	128.8874	118.9694	112.3436	110.7853	114.7121	123.0719	133.6245	143.5425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	71.9967	70.1100	66.5140	58.6849	53.8780	48.8587	45.7987	48.3615	51.3620	56.9316	64.4396	70.9996 (72)
Total internal gains	346.7587	354.5456	338.9075	325.2434	307.3591	294.9466	282.7361	283.7406	293.1927	304.5972	325.1826	339.1358 (73)

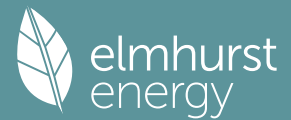
#### 6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
East	12.0500	19.6403	0.5500	0.9000	0.7700	81.1844 (76)						
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621 (83)
Total gains	427.9432	513.3596	600.4515	706.6898	774.8360	773.4923	738.3311	675.0900	597.3792	493.0434	426.4100	405.8980 (84)

#### 7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	47.9939	48.0973	48.1990	48.6825	48.7740	49.2048	49.2048	49.2854	49.0379	48.7740	48.5892	48.3974
alpha	4.1996	4.2065	4.2133	4.2455	4.2516	4.2803	4.2803	4.2857	4.2692	4.2516	4.2393	4.2265
util living area	0.9924	0.9832	0.9593	0.8873	0.7514	0.5688	0.4233	0.4788	0.7317	0.9371	0.9852	0.9938 (86)
MIT	19.3873	19.6391	20.0201	20.4900	20.8106	20.9562	20.9901	20.9836	20.8750	20.4107	19.8116	19.3474 (87)
Th 2	19.7275	19.7299	19.7322	19.7431	19.7451	19.7547	19.7547	19.7564	19.7510	19.7451	19.7410	19.7367 (88)
util rest of house												
MIT 2	0.9898	0.9776	0.9458	0.8519	0.6830	0.4698	0.3069	0.3554	0.6353	0.9088	0.9793	0.9918 (89)
MIT 2	17.8956	18.2158	18.6927	19.2595	19.6004	19.7326	19.7520	19.7515	19.6749	19.1873	18.4452	17.8510 (90)

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Living area fraction										FLA = Living area / (4) =	0.6374 (91)	
MIT	18.8464	19.1230	19.5387	20.0439	20.3718	20.5125	20.5412	20.5368	20.4398	19.9671	19.3161	18.8048 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8464	19.1230	19.5387	20.0439	20.3718	20.5125	20.5412	20.5368	20.4398	19.9671	19.3161	18.8048 (93)

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9874	0.9742	0.9433	0.8614	0.7189	0.5313	0.3812	0.4340	0.6914	0.9147	0.9767	0.9897	(94)
Useful gains	422.5366	500.1074	566.4151	608.7078	557.0268	410.9877	281.4359	292.9599	413.0368	450.9892	416.4875	401.7042	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1076.1713	1049.9887	960.5308	812.7860	631.2947	426.6547	284.4013	298.0330	459.0498	681.9154	892.7047	1071.4866	(97)
Space heating kWh	486.3042	369.5202	293.2221	146.9363	55.2553	0.0000	0.0000	0.0000	0.0000	171.8091	342.8764	498.3181	(98a)
Space heating requirement - total per year (kWh/year)												2364.2417	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	486.3042	369.5202	293.2221	146.9363	55.2553	0.0000	0.0000	0.0000	0.0000	171.8091	342.8764	498.3181	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2364.2417	
Space heating per m2												(98c) / (4) =	46.2398 (99)

## 9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	486.3042	369.5202	293.2221	146.9363	55.2553	0.0000	0.0000	0.0000	0.0000	171.8091	342.8764	498.3181	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	486.3042	369.5202	293.2221	146.9363	55.2553	0.0000	0.0000	0.0000	0.0000	171.8091	342.8764	498.3181	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Water heating													
Water heating requirement	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	(64)
Efficiency of water heater													
(217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	53.8195	47.5199	50.3085	43.8336	42.2164	37.7440	37.0425	38.6837	39.2954	44.1720	47.4000	53.1810	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	12.6341	10.1356	9.1259	6.6861	5.1645	4.2194	4.7112	6.1238	7.9543	10.4364	11.7879	12.9853	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2364.2417 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													349.4100
Water heating fuel used													535.2165 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													101.9646 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													3001.4228 (238)

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

Energy                      Emission factor                      Emissions

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	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	2364.2417	0.1556	367.9256 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	535.2165	0.1411	75.5146 (264)
Space and water heating			443.4403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	101.9646	0.1443	14.7166 (268)
Total CO2, kg/year			458.1569 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			8.9600 (273)

## 13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2364.2417	1.5761	3726.3590 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	535.2165	1.5217	814.4474 (278)
Space and water heating			4540.8064 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	101.9646	1.5338	156.3966 (282)
Total Primary energy kWh/year			4697.2030 (286)
Dwelling Primary energy Rate (DPER)			91.8700 (287)

## SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF FABRIC ENERGY EFFICIENCY

### 1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.1300 (1b)	2.5000 (2b)	127.8250 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 127.8250 (5)

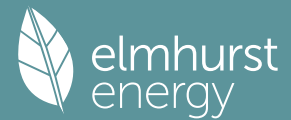
### 2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1565 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4065 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3455 (21)
Wind speed	Jan 5.1000, Feb 5.0000, Mar 4.9000, Apr 4.4000, May 4.3000, Jun 3.8000, Jul 3.8000, Aug 3.7000, Sep 4.0000, Oct 4.3000, Nov 4.5000, Dec 4.7000 (22)
Wind factor	Jan 1.2750, Feb 1.2500, Mar 1.2250, Apr 1.1000, May 1.0750, Jun 0.9500, Jul 0.9500, Aug 0.9250, Sep 1.0000, Oct 1.0750, Nov 1.1250, Dec 1.1750 (22a)
Adj infilt rate	0.4405, 0.4319, 0.4232, 0.3800, 0.3714, 0.3282, 0.3282, 0.3196, 0.3455, 0.3714, 0.3887, 0.4060 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000 (23c)
Effective ac	0.5970, 0.5933, 0.5896, 0.5722, 0.5690, 0.5539, 0.5539, 0.5511, 0.5597, 0.5690, 0.5755, 0.5824 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Glazing			12.0500	1.2357	14.8907		(27)
Door			1.9500	1.3000	2.5350		(26)
External Wall	41.4450	12.0500	29.3950	0.1800	5.2911		(29a)
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)
External Roof 1	49.9000		49.9000	0.1400	6.9860		(30)
Total net area of external elements Aum, (m2)			94.4750				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.9034		(33)
Main dwelling							
Party Floor 1			51.1300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							18.8950 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	48.7984 (37)

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Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	25.1838	25.0248	24.8691	24.1374	24.0005	23.3632	23.3632	23.2452	23.6087	24.0005	24.2774	24.5669 (38)
Heat transfer coeff	73.9821	73.8232	73.6674	72.9358	72.7989	72.1616	72.1616	72.0436	72.4071	72.7989	73.0758	73.3653 (39)
Average = Sum(39)m / 12 =												72.9351
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4469	1.4438	1.4408	1.4265	1.4238	1.4113	1.4113	1.4090	1.4161	1.4238	1.4292	1.4349 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

#### 4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7234 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869	(42b)
Hot water usage for other uses	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794	(42c)
Average daily hot water use (litres/day)													50.6367 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	55.2440	53.7291	52.0750	50.0157	48.1788	46.2697	45.8726	47.5233	49.2164	51.1769	53.2545	55.1663	(44)
Energy conte	87.4929	76.5095	80.0374	68.4690	64.8579	56.8941	55.4789	58.8438	60.6887	69.4466	75.8708	86.3771	(45)
Energy content (annual)													Total = Sum(45)m = 840.9668
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
FV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	74.3690	65.0331	68.0318	58.1986	55.1292	48.3599	47.1571	50.0172	51.5854	59.0296	64.4902	73.4206	(64)
12Total per year (kWh/year)													715 (64)
Electric shower(s)	42.5365	37.9004	41.3858	39.4939	40.2350	38.3803	39.6597	40.2350	39.4939	41.3858	40.6076	42.5365	(64a)
													Total Energy used by instantaneous electric shower (s) = Sum(64a)m = 483.8505 (64a)
Heat gains from water heating, kWh/month	29.2264	25.7334	27.3544	24.4231	23.8411	21.6851	21.7042	22.5631	22.7698	25.1039	26.2744	28.9893	(65)

#### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703	86.1703 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	75.7427	83.8579	75.7427	78.2674	75.7427	78.2674	75.7427	75.7427	78.2674	75.7427	78.2674	75.7427 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.1683	151.7266	147.7998	139.4401	128.8874	118.9694	112.3436	110.7853	114.7121	123.0719	133.6245	143.5425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170	31.6170 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	39.2828	38.2937	36.7667	33.9210	32.0444	30.1181	29.1723	30.3267	31.6248	33.7417	36.4923	38.9641 (72)
Total internal gains	314.0448	322.7293	309.1602	300.4796	285.5256	276.2061	266.1096	265.7058	273.4554	281.4073	297.2353	307.1003 (73)

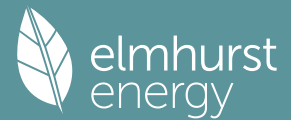
#### 6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor	W					
			W/m2	or Table 6b	or Table 6c	Table 6d						
East		12.0500	19.6403	0.5500	0.9000	0.7700	81.1844 (76)					
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621 (83)
Total gains	395.2292	481.5433	570.7042	681.9259	753.0024	754.7518	721.7047	657.0552	577.6419	469.8535	398.4627	373.8624 (84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	47.9939	48.0973	48.1990	48.6825	48.7740	49.2048	49.2048	49.2854	49.0379	48.7740	48.5892	48.3974	(86)
alpha	4.1996	4.2065	4.2133	4.2455	4.2516	4.2803	4.2803	4.2857	4.2692	4.2516	4.2393	4.2265	
util living area	0.9943	0.9866	0.9655	0.8974	0.7642	0.5805	0.4325	0.4907	0.7473	0.9457	0.9884	0.9955	(86)
MIT	19.3242	19.5801	19.9703	20.4600	20.7972	20.9526	20.9893	20.9820	20.8641	20.3754	19.7592	19.2852	(87)
Th 2	19.7275	19.7299	19.7322	19.7431	19.7451	19.7547	19.7547	19.7564	19.7510	19.7451	19.7410	19.7367	(88)
util rest of house													

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MIT 2	0.9924	0.9821	0.9537	0.8641	0.6968	0.4804	0.3139	0.3648	0.6517	0.9204	0.9837	0.9939 (89)
Living area fraction	18.2375	18.4923	18.8750	19.3407	19.6233	19.7359	19.7524	19.7522	19.6856	19.2792	18.6800	18.2054 (90)
MIT	18.9302	19.1857	19.5731	20.0541	20.3715	20.5115	20.5408	20.5361	20.4368	19.9779	19.3679	18.8937 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9302	19.1857	19.5731	20.0541	20.3715	20.5115	20.5408	20.5361	20.4368	19.9779	19.3679	18.8937 (93)

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9907	0.9796	0.9519	0.8733	0.7323	0.5427	0.3896	0.4450	0.7073	0.9259	0.9819	0.9925 (94)
Useful gains	391.5615	471.7029	543.2659	595.5422	551.4233	409.6172	281.1499	292.3968	408.5866	435.0452	391.2441	371.0720 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1082.3715	1054.6154	963.0638	813.5351	631.2778	426.5804	284.3730	297.9774	458.8283	682.6998	896.4877	1078.0055 (97)
Space heating kWh	513.9626	391.7172	312.3296	156.9549	59.4118	0.0000	0.0000	0.0000	0.0000	184.2550	363.7754	525.9585 (98a)
Space heating requirement - total per year (kWh/year)												2508.3652
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	513.9626	391.7172	312.3296	156.9549	59.4118	0.0000	0.0000	0.0000	0.0000	184.2550	363.7754	525.9585 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2508.3652
Space heating per m2												(98c) / (4) = 49.0586 (99)

## 8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	678.3192	533.9960	547.5314	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8913	0.9375	0.9115	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	604.5905	500.6140	499.0891	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	855.1827	818.0558	743.9393	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	180.4264	236.1767	182.1685	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	45.1066	59.0442	45.5421	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												149.6929 (107)
Energy for space heating												49.0586 (99)
Energy for space cooling												2.9277 (108)
Total												51.9863 (109)
Fabric Energy Efficiency (DFEE)												52.0 (109)

## SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)

### CALCULATION OF ENERGY RATING

#### 1. Overall dwelling characteristics

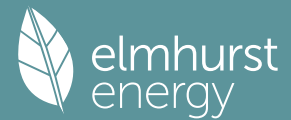
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.1300 (1b)	2.5000 (2b)	127.8250 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 127.8250 (5)

#### 2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1565 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4065 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3455 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)

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Adj infilt rate	0.4405	0.4319	0.4232	0.3800	0.3714	0.3282	0.3282	0.3196	0.3455	0.3714	0.3887	0.4060 (22b)
Effective ac	0.5970	0.5933	0.5896	0.5722	0.5690	0.5539	0.5539	0.5511	0.5597	0.5690	0.5755	0.5824 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Glazing			12.0500	1.2357	14.8907		(27)					
Door			1.9500	1.3000	2.5350		(26)					
External Wall	41.4450	12.0500	29.3950	0.1800	5.2911		(29a)					
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)					
External Roof 1	49.9000		49.9000	0.1400	6.9860		(30)					
Total net area of external elements Aum(A, m2)			94.4750				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26) ... (30) + (32) =	29.9034	(33)					
Main dwelling												
Party Floor 1			51.1300				(32d)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							18.8950 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	48.7984 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	25.1838	25.0248	24.8691	24.1374	24.0005	23.3632	23.3632	23.2452	23.6087	24.0005	24.2774	24.5669 (38)
Average = Sum(39)m / 12 =												
HLP	1.4469	1.4438	1.4408	1.4265	1.4238	1.4113	1.4113	1.4090	1.4161	1.4238	1.4292	1.4349 (40)
HLP (average)												1.4265
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

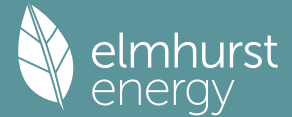
### 4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7234 (42)
Hot water usage for mixer showers												46.2978 (42a)
Hot water usage for baths												22.8869 (42b)
Hot water usage for other uses												32.2794 (42c)
Average daily hot water use (litres/day)												93.4859 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	101.7199	99.5066	96.8347	92.8281	89.5541	86.0425	84.7344	87.3952	90.1955	93.8767	97.9434	101.4642 (44)
Energy content (annual)	161.0994	141.6960	148.8314	127.0770	120.5571	105.7992	102.4789	108.2135	111.2200	127.3898	139.5384	158.8684 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1552.7691
Water storage loss:												23.8303 (46)
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												26.9514 (56)
If cylinder contains dedicated solar storage												26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198 (64)
Electric shower(s)												1870.1001 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	53.5656	47.1139	49.4864	42.2531	40.0852	35.1782	34.0742	35.9810	36.9807	42.3571	46.3965	52.8237 (65)

### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.4341	12.8203	10.4261	7.8933	5.9003	4.9813	5.3825	6.9963	9.3904	11.9233	13.9163	14.8353 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	71.9967	70.1100	66.5140	58.6849	53.8780	48.8587	45.7987	48.3615	51.3620	56.9316	64.4396	70.9996 (72)
Total internal gains	392.0946	390.9198	379.0688	356.2295	333.6795	312.9382	300.3901	302.2410	313.4966	334.0762	359.3274	381.6094 (73)

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## 6. Solar gains

[Jan]												Gains W	
	Area m2				Solar flux Table 6a W/m2		Specific data or Table 6b g		Specific data or Table 6c FF		Access factor Table 6d		
East	12.0500				19.6403		0.5500		0.9000		0.7700		81.1844 (76)
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621 (83)	
Total gains	473.2790	549.7338	640.6128	737.6759	801.1563	791.4839	755.9852	693.5904	617.6831	522.5224	460.5548	448.3715 (84)	

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	47.9939	48.0973	48.1990	48.6825	48.7740	49.2048	49.2048	49.2854	49.0379	48.7740	48.5892	48.3974	
alpha	4.1996	4.2065	4.2133	4.2455	4.2516	4.2803	4.2803	4.2857	4.2692	4.2516	4.2393	4.2265	
util living area	0.9890	0.9786	0.9501	0.8742	0.7360	0.5578	0.4140	0.4671	0.7160	0.9253	0.9806	0.9911 (86)	
MIT	19.4736	19.7053	20.0850	20.5257	20.8255	20.9593	20.9909	20.9851	20.8853	20.4536	19.8745	19.4291 (87)	
Th 2	19.3275	19.7299	19.7322	19.7431	19.7451	19.7547	19.7547	19.7564	19.7510	19.7451	19.7410	19.7367 (88)	
util rest of house	0.9853	0.9718	0.9341	0.8364	0.6667	0.4599	0.2999	0.3461	0.6189	0.8933	0.9731	0.9882 (89)	
MIT 2	18.0047	18.2984	18.7706	19.2978	19.6131	19.7343	19.7522	19.7520	19.6820	19.2352	18.5234	17.9546 (90)	
Living area fraction	fLA = Living area / (4) = 0.6374 (91)												
MIT	18.9409	19.1952	19.6084	20.0805	20.3859	20.5151	20.5418	20.5379	20.4490	20.0118	19.3846	18.8944 (92)	
Temperature adjustment	0.0000												
adjusted MIT	18.9409	19.1952	19.6084	20.0805	20.3859	20.5151	20.5418	20.5379	20.4490	20.0118	19.3846	18.8944 (93)	

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9824	0.9681	0.9323	0.8476	0.7038	0.5209	0.3727	0.4232	0.6759	0.9012	0.9703	0.9855 (94)
Useful gains	464.9328	532.1962	597.2435	625.2525	563.8417	412.2935	281.7252	293.5019	417.4922	470.8930	446.8973	441.8813 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1083.1682	1055.3157	965.6636	815.4547	632.3237	426.8416	284.4444	298.1127	459.7113	685.1694	897.7056	1078.0616 (97)
Space heating kWh	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181 (98a)
Space heating requirement - total per year (kWh/year)												2230.8259
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2230.8259
Space heating per m2												(98c) / (4) = 43.6305 (99)

## 9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Space heating fuel used, main system 2													0.0000 (213)
Water heating													
Water heating requirement	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198 (64)	
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100 (216)	
Fuel for water heating, kWh/month	53.8195	47.5199	50.3085	43.8336	42.2164	37.7440	37.0425	38.6837	39.2954	44.1720	47.4000	53.1810 (219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	12.6341	10.1356	9.1259	6.6861	5.1645	4.2194	4.7112	6.1238	7.9543	10.4364	11.7879	12.9853 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													

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(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2230.8259	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												535.2165	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												101.9646	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2868.0070	(238)

## 10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2230.8259	16.4900	367.8632	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	535.2165	16.4900	88.2572	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	101.9646	16.4900	16.8140	(250)
Additional standing charges			0.0000	(251)
Total energy cost			472.9344	(255)

## 11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.7711	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	71.2904	
SAP rating (Section 12)		71	(258)
SAP band		C	

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2230.8259	0.1557	347.3112	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	535.2165	0.1411	75.5146	(264)
Space and water heating			422.8259	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	101.9646	0.1443	14.7166	(268)
Total CO2, kg/year			437.5425	(272)
CO2 emissions per m2			8.5600	(273)
EI value			93.9009	
EI rating			94	(274)
EI band			A	

## SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

### 1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	127.8250 (5)	

### 2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)

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Number of passive vents 0 \* 10 = 0.0000 (7b)  
 Number of flueless gas fires 0 \* 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1565 (8)  
 Pressure test Yes  
 Pressure Test Method Blower Door  
 Measured/design AP50 5.0000 (17)  
 Infiltration rate 0.4065 (18)  
 Number of sides sheltered 2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)  
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3455 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate												
Effective ac	0.4146	0.3887	0.3800	0.3369	0.3369	0.3109	0.3196	0.3023	0.3196	0.3455	0.3541	0.3800 (22b)
	0.5859	0.5755	0.5722	0.5567	0.5567	0.5483	0.5511	0.5457	0.5511	0.5597	0.5627	0.5722 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
Main dwelling							
Glazing			12.0500	1.2357	14.8907		(27)
Door			1.9500	1.3000	2.5350		(26)
External Wall	41.4450	12.0500	29.3950	0.1800	5.2911		(29a)
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)
External Roof 1	49.9000		49.9000	0.1400	6.9860		(30)
Total net area of external elements Aum(A, m <sup>2</sup> )			94.4750				(31)
Fabric heat loss, W/K = Sum (A x U)					29.9034		(33)
Main dwelling Party Floor 1			51.1300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							18.8950 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	48.7984 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	24.7164	24.2774	24.1374	23.4844	23.4844	23.1304	23.2452	23.0186	23.2452	23.6087	23.7361	24.1374 (38)
Average = Sum(39)m / 12 =	73.5148	73.0758	72.9358	72.2828	72.2828	71.9287	72.0436	71.8170	72.0436	72.4071	72.5345	72.9358 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4378	1.4292	1.4265	1.4137	1.4137	1.4068	1.4090	1.4046	1.4090	1.4161	1.4186	1.4265 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

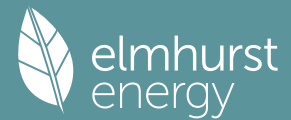
### 4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7234 (42)
Hot water usage for mixer showers	46.4759	45.7775	44.7597	42.8124	41.3753	39.7727	38.8618	39.8719	40.9791	42.6998	44.6889	46.2978	46.2978 (42a)
Hot water usage for baths	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869	22.8869 (42b)
Hot water usage for other uses	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794	32.2794 (42c)
Average daily hot water use (litres/day)													93.4859 (43)
Daily hot water use	101.7199	99.5066	96.8347	92.8281	89.5541	86.0425	84.7344	87.3952	90.1955	93.8767	97.9434	101.4642	101.4642 (44)
Energy content (annual)	161.0994	141.6960	148.8314	127.0770	120.5571	105.7992	102.4789	108.2135	111.2200	127.3898	139.5384	158.8684	158.8684 (45)
Distribution loss (46)m = 0.15 x (45)m	24.1649	21.2544	22.3247	19.0615	18.0836	15.8699	15.3718	16.2320	16.6830	19.1085	20.9308	23.8303	23.8303 (46)
Water storage loss:													201.0000 (47)
Store volume													1.6100 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.8694 (55)
Enter (49) or (54) in (55)													
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	185.8198 (62)
WVHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	185.8198 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	53.5656	47.1139	49.4864	42.2531	40.0852	35.1782	34.0742	35.9810	36.9807	42.3571	46.3965	52.8237	52.8237 (65)

### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.4341	12.8203	10.4261	7.8933	5.9003	4.9813	5.3825	6.9963	9.3904	11.9233	13.9163	14.8353	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	(71)
Water heating gains (Table 5)	71.9967	70.1100	66.5140	58.6849	53.8780	48.8587	45.7987	48.3615	51.3620	56.9316	64.4396	70.9996	(72)
Total internal gains	392.0946	390.9198	379.0688	356.2295	333.6795	312.9382	300.3901	302.2410	313.4966	334.0762	359.3274	381.6094	(73)

## 6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
East	12.0500				23.7288	0.5500	0.9000	0.7700	98.0847 (76)				
Solar gains	98.0847	170.5150	279.0239	426.9369	501.3956	547.9057	515.8583	448.5072	346.8184	216.2010	123.4914	78.0013	(83)
Total gains	490.1793	561.4348	658.0926	783.1664	835.0751	860.8439	816.2484	750.7483	660.3149	550.2773	482.8188	459.6107	(84)

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	48.2990	48.5892	48.6825	49.1223	49.3641	49.2854	49.2854	49.4408	49.2854	49.0379	48.9518	48.6825	
alpha	4.2199	4.2393	4.2455	4.2748	4.2748	4.2909	4.2857	4.2961	4.2857	4.2692	4.2635	4.2455	
util living area	0.9853	0.9742	0.9375	0.8338	0.6647	0.4582	0.3161	0.3328	0.6135	0.8821	0.9703	0.9878	(86)
MIT	19.6190	19.8168	20.2079	20.6433	20.8957	20.9832	20.9974	20.9969	20.9456	20.6241	20.0661	19.6060	(87)
Th 2	19.7345	19.7410	19.7431	19.7528	19.7528	19.7581	19.7564	19.7598	19.7564	19.7510	19.7491	19.7431	(88)
util rest of house	0.9804	0.9658	0.9176	0.7874	0.5861	0.3611	0.2078	0.2159	0.5035	0.8328	0.9584	0.9835	(89)
MIT 2	18.1940	18.4462	18.9279	19.4334	19.6821	19.7514	19.7560	19.7594	19.7301	19.4311	18.7687	18.1841	(90)
Living area fraction									fLA = Living area / (4) =			0.6374	(91)
MIT	19.1023	19.3198	19.7437	20.2046	20.4556	20.5365	20.5473	20.5482	20.5048	20.1915	19.5957	19.0904	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1023	19.3198	19.7437	20.2046	20.4556	20.5365	20.5473	20.5482	20.5048	20.1915	19.5957	19.0904	(93)

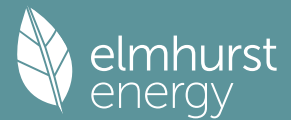
## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9772	0.9623	0.9176	0.8055	0.6318	0.4226	0.2770	0.2906	0.5717	0.8523	0.9566	0.9806	(94)
Useful gains	479.0022	540.2423	603.8621	630.8338	527.6315	363.8056	226.0629	218.1324	377.4805	468.9869	461.8521	450.7095	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	1036.7250	1017.2018	922.1810	773.7595	567.8278	369.4649	226.7399	218.9119	396.5889	614.8453	833.8333	1013.1064	(97)
Space heating kWh	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(98a)
Space heating requirement - total per year (kWh/year)												1899.8728	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1899.8728	
Space heating per m2										(98c) / (4) =		37.1577	(99)

## 9a. Energy requirements - Individual heating systems, including micro-CHP

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	(64)
Efficiency of water heater													349.4100 (216)
(217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(217)
Fuel for water heating, kWh/month													

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Space cooling fuel requirement (221)m	53.8195	47.5199	50.3085	43.8336	42.2164	37.7440	37.0425	38.6837	39.2954	44.1720	47.4000	53.1810	(219)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Lighting	12.6341	10.1356	9.1259	6.6861	5.1645	4.2194	4.7112	6.1238	7.9543	10.4364	11.7879	12.9853	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1899.8728	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												535.2165	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												101.9646	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2537.0539	(238)

## 10a. Fuel costs - using BEDF prices (574)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1899.8728	28.4300	540.1338	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	535.2165	28.4300	152.1621	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	101.9646	28.4300	28.9885	(250)
Additional standing charges			0.0000	(251)
Total energy cost			721.2844	(255)

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1899.8728	0.1564	297.2203	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	535.2165	0.1411	75.5146	(264)
Space and water heating			372.7349	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	101.9646	0.1443	14.7166	(268)
Total CO2, kg/year			387.4516	(272)

## 13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1899.8728	1.5792	3000.2285	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	535.2165	1.5217	814.4474	(278)
Space and water heating			3814.6759	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	101.9646	1.5338	156.3966	(282)
Total Primary energy kWh/year			3971.0725	(286)

## SAP 10 EPC IMPROVEMENTS

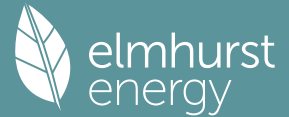
New Unit - Be Green Dimplex

Current energy efficiency rating: C 71  
 Current environmental impact rating: A 94

N Solar water heating Not applicable  
 U Solar photovoltaic panels Not applicable  
 V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change

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(none)

Recommended measures (none)	Typical annual savings		Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 71  
 Potential environmental impact rating: A 94

Fuel prices for cost data on this page from database revision number 574 TEST (30 Jun 2025)  
 Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):			
	Current	Potential	Saving
Electricity	£721	£721	£0
Space heating	£540	£540	£0
Water heating	£152	£152	£0
Lighting	£29	£29	£0
Total cost of fuels	£721	£721	£0
Total cost of uses	£721	£721	£0
Delivered energy	50 kWh/m²	50 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.4 tonnes	0.4 tonnes	0.0 tonnes
CO2 emissions per m²	8 kg/m²	8 kg/m²	0 kg/m²
Primary energy	78 kWh/m²	78 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)  
 CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

### 1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.8250 (5)

### 2. Ventilation rate

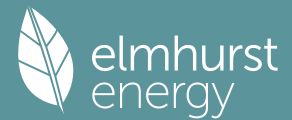
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1565 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4065 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3455 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4405	0.4319	0.4232	0.3800	0.3714	0.3282	0.3282	0.3196	0.3455	0.3714	0.3887	0.4060 (22b)
Effective ac	0.5970	0.5933	0.5896	0.5722	0.5690	0.5539	0.5539	0.5511	0.5597	0.5690	0.5755	0.5824 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Glazing			12.0500	1.2357	14.8907		(27)
Door			1.9500	1.3000	2.5350		(26)
External Wall	41.4450	12.0500	29.3950	0.1800	5.2911		(29a)
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)
External Roof 1	49.9000		49.9000	0.1400	6.9860		(30)
Total net area of external elements Aum(A, m2)			94.4750				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.9034	(33)
Main dwelling							
Party Floor 1			51.1300				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)							18.8950 (36)
Point Thermal bridges						(36a) =	0.0000

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Total fabric heat loss (33) + (36) + (36a) = 48.7984 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	25.1838	25.0248	24.8691	24.1374	24.0005	23.3632	23.3632	23.2452	23.6087	24.0005	24.2774	24.5669 (38)
Heat transfer coeff	73.9821	73.8232	73.6674	72.9358	72.7989	72.1616	72.1616	72.0436	72.4071	72.7989	73.0758	73.3653 (39)
Average = Sum(39)m / 12 =												72.9351
HLP	1.4469	1.4438	1.4408	1.4265	1.4238	1.4113	1.4113	1.4090	1.4161	1.4238	1.4292	1.4349 (40)
HLP (average)												1.4265
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

## 4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Hot water usage for mixer showers												1.7234 (42)
Hot water usage for baths	46.4759	45.7775	44.7597	42.8124	41.3753	39.7727	38.8618	39.8719	40.9791	42.6998	44.6889	46.2978 (42a)
Hot water usage for other uses	22.9646	22.6235	22.1432	21.2577	20.5946	19.8593	19.4622	19.9391	20.4584	21.2451	22.1489	22.8869 (42b)
Average daily hot water use (litres/day)	32.2794	31.1056	29.9318	28.7580	27.5842	26.4104	26.4104	27.5842	28.7580	29.9318	31.1056	32.2794 (42c)
												93.4859 (43)
Daily hot water use	101.7199	99.5066	96.8347	92.8281	89.5541	86.0425	84.7344	87.3952	90.1955	93.8767	97.9434	101.4642 (44)
Energy content (annual)	161.0994	141.6960	148.8314	127.0770	120.5571	105.7992	102.4789	108.2135	111.2200	127.3898	139.5384	158.8684 (45)
Distribution loss (46)m = 0.15 x (45)m	24.1649	21.2544	22.3247	19.0615	18.0836	15.8699	15.3718	16.2320	16.6830	19.1085	20.9308	23.8303 (46)
Water storage loss:												
Store volume												201.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198 (64)
												Total per year (kWh/year) = Sum(64)m = 1870.1001 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	53.5656	47.1139	49.4864	42.2531	40.0852	35.1782	34.0742	35.9810	36.9807	42.3571	46.3965	52.8237 (65)

## 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.4341	12.8203	10.4261	7.8933	5.9003	4.9813	5.3825	6.9963	9.3904	11.9233	13.9163	14.8353 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362 (71)
Water heating gains (Table 5)	71.9967	70.1100	66.5140	58.6849	53.8780	48.8587	45.7987	48.3615	51.3620	56.9316	64.4396	70.9996 (72)
Total internal gains	392.0946	390.9198	379.0688	356.2295	333.6795	312.9382	300.3901	302.2410	313.4966	334.0762	359.3274	381.6094 (73)

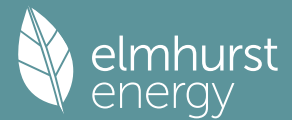
## 6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
East	12.0500	19.6403	0.5500	0.9000	0.7700	81.1844 (76)						
Solar gains	81.1844	158.8140	261.5440	381.4464	467.4768	478.5457	455.5950	391.3494	304.1865	188.4462	101.2275	66.7621 (83)
Total gains	473.2790	549.7338	640.6128	737.6759	801.1563	791.4839	755.9852	693.5904	617.6831	522.5224	460.5548	448.3715 (84)

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	47.9939	48.0973	48.1990	48.6825	48.7740	49.2048	49.2048	49.2854	49.0379	48.7740	48.5892	48.3974
alpha	4.1996	4.2065	4.2133	4.2455	4.2516	4.2803	4.2803	4.2857	4.2692	4.2516	4.2393	4.2265
util living area	0.9890	0.9786	0.9501	0.8742	0.7360	0.5578	0.4140	0.4671	0.7160	0.9253	0.9806	0.9911 (86)

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MIT	19.4736	19.7053	20.0850	20.5257	20.8255	20.9593	20.9909	20.9851	20.8853	20.4536	19.8745	19.4291 (87)
Th 2	19.7275	19.7299	19.7322	19.7431	19.7451	19.7547	19.7547	19.7564	19.7510	19.7451	19.7410	19.7367 (88)
util rest of house												
	0.9853	0.9718	0.9341	0.8364	0.6667	0.4599	0.2999	0.3461	0.6189	0.8933	0.9731	0.9882 (89)
MIT 2	18.0047	18.2984	18.7706	19.2978	19.6131	19.7343	19.7522	19.7520	19.6820	19.2352	18.5234	17.9546 (90)
Living area fraction									fLA = Living area / (4) =			0.6374 (91)
MIT	18.9409	19.1952	19.6084	20.0805	20.3859	20.5151	20.5418	20.5379	20.4490	20.0118	19.3846	18.8944 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9409	19.1952	19.6084	20.0805	20.3859	20.5151	20.5418	20.5379	20.4490	20.0118	19.3846	18.8944 (93)

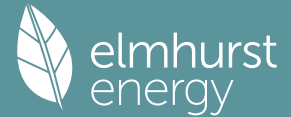
## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9824	0.9681	0.9323	0.8476	0.7038	0.5209	0.3727	0.4232	0.6759	0.9012	0.9703	0.9855	(94)
Useful gains	464.9328	532.1962	597.2435	625.2525	563.8417	412.2935	281.7252	293.5019	417.4922	470.8930	446.8973	441.8813	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1083.1682	1055.3157	965.6636	815.4547	632.3237	426.8416	284.4444	298.1127	459.7113	685.1694	897.7056	1078.0616	(97)
Space heating kWh	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181	(98a)
Space heating requirement - total per year (kWh/year)												2230.8259	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2230.8259	
Space heating per m2												(98c) / (4) =	43.6305 (99)

## 9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	459.9671	351.5363	274.1045	136.9456	50.9506	0.0000	0.0000	0.0000	0.0000	159.4217	324.5820	473.3181	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Water heating													
Water heating requirement	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	(64)
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)
Fuel for water heating, kWh/month	53.8195	47.5199	50.3085	43.8336	42.2164	37.7440	37.0425	38.6837	39.2954	44.1720	47.4000	53.1810	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	12.6341	10.1356	9.1259	6.6861	5.1645	4.2194	4.7112	6.1238	7.9543	10.4364	11.7879	12.9853	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2230.8259 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													349.4100
Water heating fuel used													535.2165 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													101.9646 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													2868.0070 (238)

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## 10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2230.8259	16.4900	367.8632 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	535.2165	16.4900	88.2572 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	101.9646	16.4900	16.8140 (250)
Additional standing charges			0.0000 (251)
Total energy cost			472.9344 (255)

## 11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.7711 (257)
SAP value		71.2904
SAP rating (Section 12)		71 (258)
SAP band		C

## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2230.8259	0.1557	347.3112 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	535.2165	0.1411	75.5146 (264)
Space and water heating			422.8259 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	101.9646	0.1443	14.7166 (268)
Total CO2, kg/year			437.5425 (272)
CO2 emissions per m2			8.5600 (273)
EI value			93.9009
EI rating			94 (274)
EI band			A

## SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

### 1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.1300 (1b)	x 2.5000 (2b)	= 127.8250 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.1300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	127.8250 (5)

### 2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)										
Number of open flues	0 * 20 =	0.0000 (6b)										
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)										
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)										
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)										
Number of blocked chimneys	0 * 20 =	0.0000 (6f)										
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)										
Number of passive vents	0 * 10 =	0.0000 (7b)										
Number of flueless gas fires	0 * 40 =	0.0000 (7c)										
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1565 (8)									
Pressure test		Yes										
Pressure Test Method		Blower Door										
Measured/design AP50		5.0000	(17)									
Infiltration rate		0.4065	(18)									
Number of sides sheltered		2	(19)									
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)									
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3455 (21)									
Wind speed	Jan 4.8000	Feb 4.5000	Mar 4.4000	Apr 3.9000	May 3.9000	Jun 3.6000	Jul 3.7000	Aug 3.5000	Sep 3.7000	Oct 4.0000	Nov 4.1000	Dec 4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.4146	0.3887	0.3800	0.3369	0.3369	0.3109	0.3196	0.3023	0.3196	0.3455	0.3541	0.3800 (22b)
Effective ac	0.5859	0.5755	0.5722	0.5567	0.5567	0.5483	0.5511	0.5457	0.5511	0.5597	0.5627	0.5722 (25)

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### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Glazing			12.0500	1.2357	14.8907		(27)					
Door			1.9500	1.3000	2.5350		(26)					
External Wall	41.4450	12.0500	29.3950	0.1800	5.2911		(29a)					
Corridor Wall	3.1300	1.9500	1.1800	0.1700	0.2006		(29a)					
External Roof 1	49.9000		49.9000	0.1400	6.9860		(30)					
Total net area of external elements Aum(A, m2)			94.4750				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.9034	(33)					
Main dwelling												
Party Floor 1			51.1300				(32d)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							18.8950 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	48.7984 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	24.7164	24.2774	24.1374	23.4844	23.4844	23.1304	23.2452	23.0186	23.2452	23.6087	23.7361	24.1374
Average = Sum(39)m / 12 =	73.5148	73.0758	72.9358	72.2828	72.2828	71.9287	72.0436	71.8170	72.0436	72.4071	72.5345	72.9358
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4378	1.4292	1.4265	1.4137	1.4137	1.4068	1.4090	1.4046	1.4090	1.4161	1.4186	1.4265
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

### 4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7234 (42)	
Hot water usage for mixer showers														46.2978 (42a)
Hot water usage for baths														22.8869 (42b)
Hot water usage for other uses														32.2794 (42c)
Average daily hot water use (litres/day)														93.4859 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	101.7199	99.5066	96.8347	92.8281	89.5541	86.0425	84.7344	87.3952	90.1955	93.8767	97.9434	101.4642	(44)	
Energy content (annual)	161.0994	141.6960	148.8314	127.0770	120.5571	105.7992	102.4789	108.2135	111.2200	127.3898	139.5384	158.8684	(45)	
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 1552.7691	
Water storage loss:	24.1649	21.2544	22.3247	19.0615	18.0836	15.8699	15.3718	16.2320	16.6830	19.1085	20.9308	23.8303	(46)	
Store volume													201.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)	
Temperature factor from Table 2b													0.5400 (49)	
Enter (49) or (54) in (55)													0.8694 (55)	
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	(64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)	
Heat gains from water heating, kWh/month	53.5656	47.1139	49.4864	42.2531	40.0852	35.1782	34.0742	35.9810	36.9807	42.3571	46.3965	52.8237	(65)	

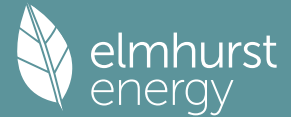
### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043	103.4043
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.4341	12.8203	10.4261	7.8933	5.9003	4.9813	5.3825	6.9963	9.3904	11.9233	13.9163	14.8353
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.1318	226.4576	220.5967	208.1195	192.3693	177.5663	167.6770	165.3513	171.2122	183.6893	199.4395	214.2425
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638	47.0638
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362	-68.9362
Water heating gains (Table 5)	71.9967	70.1100	66.5140	58.6849	53.8780	48.8587	45.7987	48.3615	51.3620	56.9316	64.4396	70.9996
Total internal gains	392.0946	390.9198	379.0688	356.2295	333.6795	312.9382	300.3901	302.2410	313.4966	334.0762	359.3274	381.6094

### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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East	12.0500			23.7288			0.5500			0.9000			0.7700			98.0847 (76)		
Solar gains	98.0847	170.5150	279.0239	426.9369	501.3956	547.9057	515.8583	448.5072	346.8184	216.2010	123.4914	78.0013	(83)					
Total gains	490.1793	561.4348	658.0926	783.1664	835.0751	860.8439	816.2484	750.7483	660.3149	550.2773	482.8188	459.6107	(84)					

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	48.2990	48.5892	48.6825	49.1223	49.1223	49.3641	49.2854	49.4408	49.2854	49.0379	48.9518	48.6825		
alpha	4.2199	4.2393	4.2455	4.2748	4.2748	4.2909	4.2857	4.2961	4.2857	4.2692	4.2635	4.2455		
util living area	0.9853	0.9742	0.9375	0.8338	0.6647	0.4582	0.3161	0.3328	0.6135	0.8821	0.9703	0.9878	(86)	
MIT	19.6190	19.8168	20.2079	20.6433	20.8957	20.9832	20.9974	20.9969	20.9456	20.6241	20.0661	19.6060	(87)	
Th 2	19.7345	19.7410	19.7431	19.7528	19.7528	19.7581	19.7564	19.7598	19.7564	19.7510	19.7491	19.7431	(88)	
util rest of house														
	0.9804	0.9658	0.9176	0.7874	0.5861	0.3611	0.2078	0.2159	0.5035	0.8328	0.9584	0.9835	(89)	
MIT 2	18.1940	18.4462	18.9279	19.4334	19.6821	19.7514	19.7560	19.7594	19.7301	19.4311	18.7687	18.1841	(90)	
Living area fraction									fLA = Living area / (4) =				0.6374 (91)	
MIT	19.1023	19.3198	19.7437	20.2046	20.4556	20.5365	20.5473	20.5482	20.5048	20.1915	19.5957	19.0904	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.1023	19.3198	19.7437	20.2046	20.4556	20.5365	20.5473	20.5482	20.5048	20.1915	19.5957	19.0904	(93)	

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9772	0.9623	0.9176	0.8055	0.6318	0.4226	0.2770	0.2906	0.5717	0.8523	0.9566	0.9806	(94)
Useful gains	479.0022	540.2423	603.8621	630.8338	527.6315	363.8056	226.0629	218.1324	377.4805	468.9869	461.8521	450.7095	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W													
	1036.7250	1017.2018	922.1810	773.7595	567.8278	369.4649	226.7399	218.9119	396.5889	614.8453	833.8333	1013.1064	(97)
Space heating kWh	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(98a)
Space heating requirement - total per year (kWh/year)												1899.8728	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1899.8728	
Space heating per m2												37.1577	(99)

## 9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	414.9458	320.5168	236.8293	102.9065	29.9061	0.0000	0.0000	0.0000	0.0000	108.5186	267.8265	418.4233	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Water heating														
Water heating requirement	188.0508	166.0392	175.7828	153.1590	147.5085	131.8812	129.4303	135.1649	137.3020	154.3412	165.6204	185.8198	(64)	
Efficiency of water heater (217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(216)	
Fuel for water heating, kWh/month	53.8195	47.5199	50.3085	43.8336	42.2164	37.7440	37.0425	38.6837	39.2954	44.1720	47.4000	53.1810	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(223)	
Lighting	12.6341	10.1356	9.1259	6.6861	5.1645	4.2194	4.7112	6.1238	7.9543	10.4364	11.7879	12.9853	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													1899.8728	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)

# Full SAP Calculation Printout



Efficiency of water heater	349.4100	
Water heating fuel used	535.2165	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	101.9646	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2537.0539	(238)

## 10a. Fuel costs - using BEDF prices (574)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1899.8728	28.4300	540.1338	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	535.2165	28.4300	152.1621	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	101.9646	28.4300	28.9885	(250)
Additional standing charges			0.0000	(251)
Total energy cost			721.2844	(255)

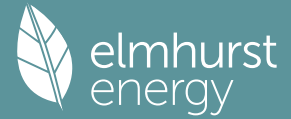
## 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1899.8728	0.1564	297.2203	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	535.2165	0.1411	75.5146	(264)
Space and water heating			372.7349	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	101.9646	0.1443	14.7166	(268)
Total CO2, kg/year			387.4516	(272)

## 13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1899.8728	1.5792	3000.2285	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	535.2165	1.5217	814.4474	(278)
Space and water heating			3814.6759	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	101.9646	1.5338	156.3966	(282)
Total Primary energy kWh/year			3971.0725	(286)

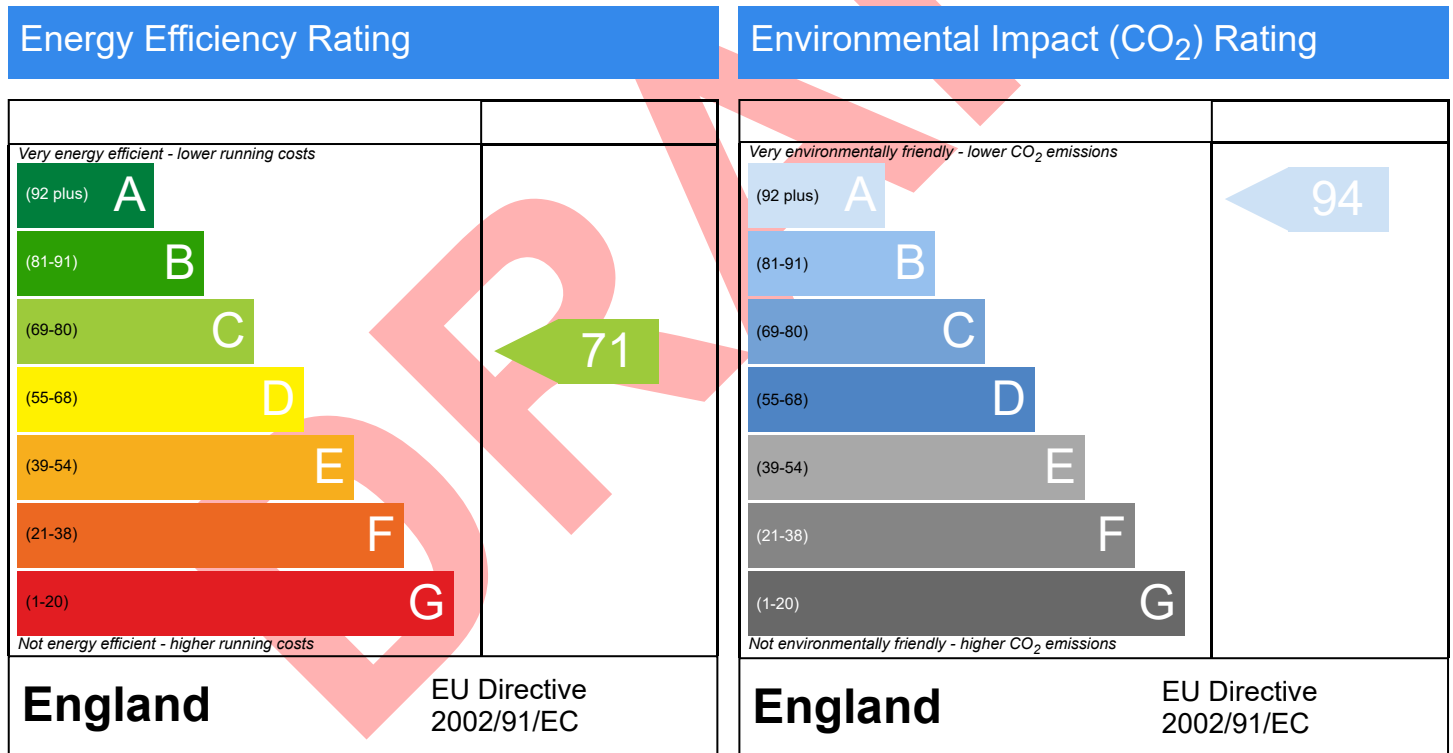
# Predicted Energy Assessment



Dwelling type: Flat, Detached  
 Date of assessment: 08/07/2025  
 Produced by: Aharon Horwich  
 Total floor area: 51.13 m<sup>2</sup>  
 DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

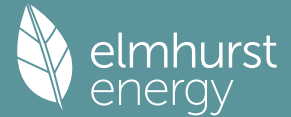
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO<sub>2</sub>) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO<sub>2</sub>) emissions. The higher the rating the less impact it has on the environment.

# Summary for Input Data



Property Reference	New Unit	Issued on Date	08/07/2025
Assessment Reference	New Unit - Be Green Dimplex	Prop Type Ref	
Property			

SAP Rating	71 C	DER	8.96	TER	
Environmental	94 A	% DER < TER			N/A
CO <sub>2</sub> Emissions (t/year)	0.39	DFEE	51.99	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	91.87	TPER	

Assessor Details	Mr. Aharon Horwich	Assessor ID	AV59-0001
Client	A, A		

## SUMMARY FOR INPUT DATA FOR: Conversion (As Designed)

Orientation	West	
Property Tenure	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, Detached	
Position of Flat	Mid-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	250.00	kJ/m <sup>2</sup> K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground floor:	17.83 m	51.13 m <sup>2</sup>	2.50 m

8.0 Living Area	32.59	m <sup>2</sup>
-----------------	-------	----------------

9.0 External Walls	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area(m <sup>2</sup> )	Nett Area (m <sup>2</sup> )	Shelter Res	Shelter	Openings	Area Calculation Type
	External Wall	Steel Frame	Other	0.18		41.45	29.40	0.00	None	12.05	Calculate Wall Area
	Corridor Wall	Steel Frame	Other	0.18		3.13	1.18	0.50	Stairwell Access Corridor 1	1.95	Enter Gross Area

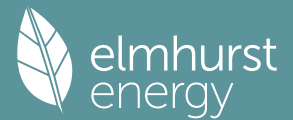
10.0 External Roofs	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area(m <sup>2</sup> )	Nett Area (m <sup>2</sup> )	Shelter Code	Shelter Factor	Calculation Type	Openings
	External Roof 1	External Flat Roof	Other	0.14	0.00	49.90	49.90	None	0.00	Enter Gross Area	0.00

11.1 Party Floors	Description	Storey Index	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
	Party Floor 1	Lowest occupied	Other	0.00	51.13

12.0 Opening Types	Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
	Glazing	Manufacturer	Window	Double glazed			0.55		0.90	1.30
	Door	Manufacturer	Solid Door				0.00			1.30

13.0 Openings	Name	Opening Type	Location	Orientation	Area (m <sup>2</sup> )	Pitch

# Summary for Input Data



D W                      Door                      Corridor Wall                      North                      1.95  
 W E                      Glazing                      External Wall                      East                      12.05

**14.0 Conservatory**                     

**15.0 Draught Proofing**                       %

**16.0 Draught Lobby**                     

**17.0 Thermal Bridging**                     

**17.1 List of Bridges**

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate		6.70			No
E4 Jamb		14.20			No
E7 Party floor between dwellings (in blocks of flats)		22.27			No
E18 Party wall between dwellings		2.50			No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)		14.05			No
E16 Corner (normal)		5.00			No
E14 Flat roof		22.27			No
P4 Party wall - Roof (insulation at ceiling level)		14.05			No

Y-value                       W/m²K

**19.0 Mechanical Ventilation**

**Mechanical Ventilation**  
 Mechanical Ventilation System Present                     

**20.0 Fans, Open Fireplaces, Flues**

Number of open chimneys                     

Number of open flues                     

Number of chimneys/flues attached to closed fire                     

Number of flues attached to solid fuel boiler                     

Number of flues attached to other heater                     

Number of blocked chimneys                     

Number of intermittent extract fans                     

Number of passive vents                     

Number of flueless gas fires                     

**21.0 Fixed Cooling System**                     

**22.0 Pressure Testing**                     

Designed AP<sub>50</sub>                       m³/(h.m²) @ 50 Pa

Test Method                     

**22.0 Lighting**

No Fixed Lighting                     

Name	Efficacy	Power	Capacity	Count
Lighting 1	185.00	10.00	1850.00	5

**24.0 Main Heating 1**

Description                     

Description                     

Percentage of Heat                       %

Fuel Type                     

SAP Code                     

    In Winter                     

    In Summer                     

Controls SAP Code                     

**25.0 Main Heating 2**

Description                     

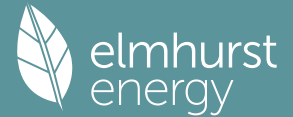
Description                     

Percentage of Heat                       %

Database Ref. No.                     

Fuel Type

# Summary for Input Data



In Winter	0.00
In Summer	349.41
Model Name	EDL200UK-630
Manufacturer	GDC Group Ltd
Controls	2100

**26.0 Heat Networks**

**27.0 Secondary Heating**

**28.0 Water Heating**

Water Heating	Main Heating 2
SAP Code	914
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
Cold Water Source	From mains
Bath Count	1
Immersion Only Heating Hot Water	No

**28.1 Showers**

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system + pump	7.00		No	

**28.3 Waste Water Heat Recovery System**

**29.0 Hot Water Cylinder**

Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	201.00	L
Loss	1.61	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

**31.0 Thermal Store**

**34.0 Small-scale Hydro**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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**Recommendations**

Lower cost measures

None

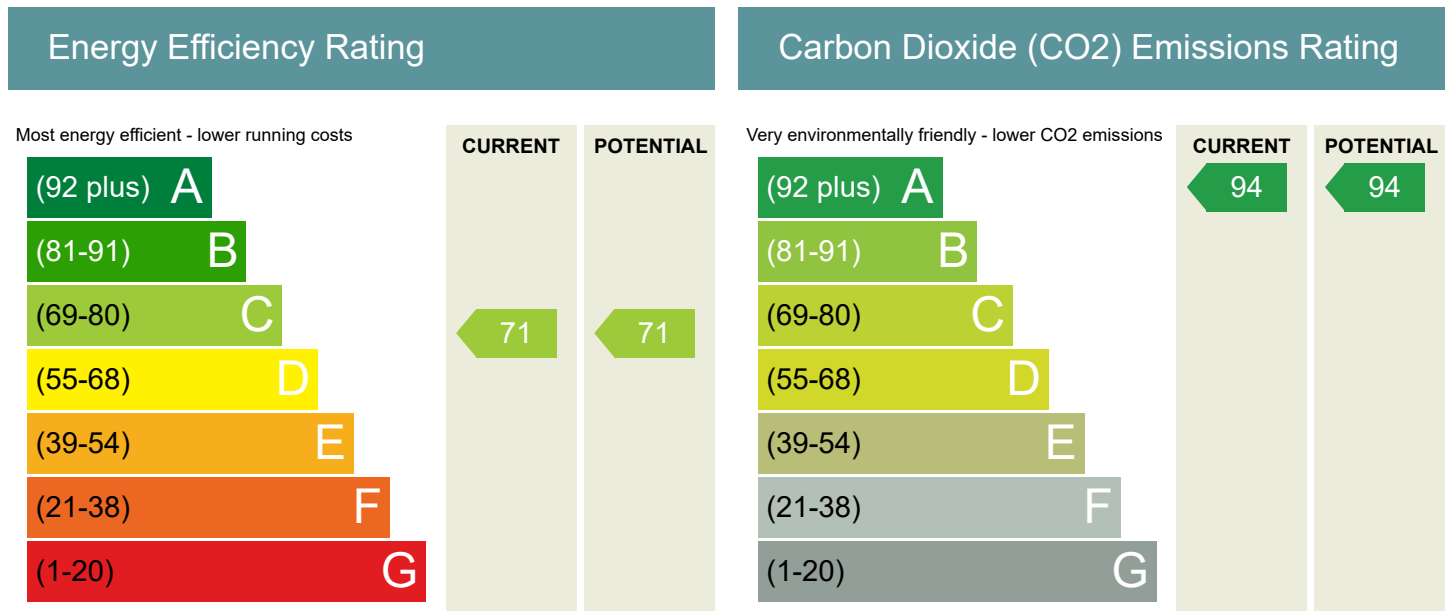
Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement	
		SAP rating	Environmental Impact
		0	0
		0	0
		0	0

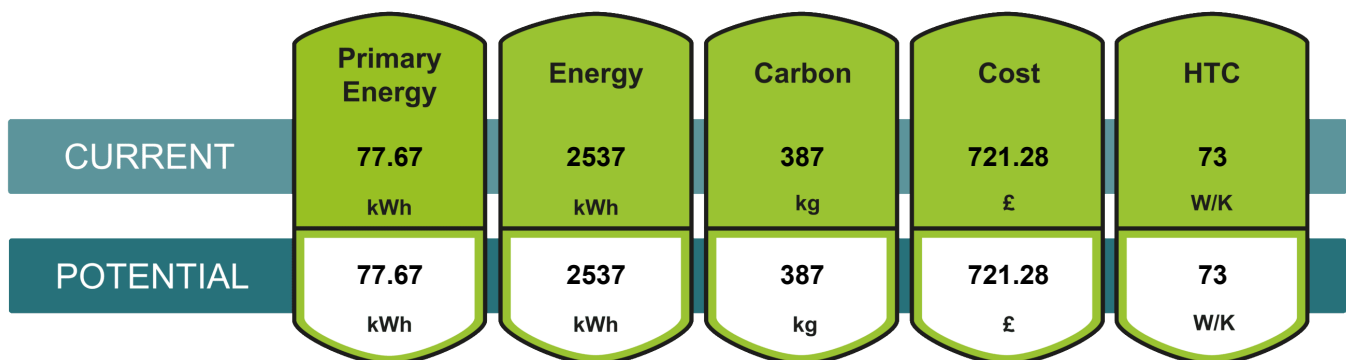
Dwelling Address	
Reference	New Unit-New Unit - Be Green Dimplex
Assessment Date	30/06/2025
Submission Date	
Property Type	Flat, Detached
Total Floor Area	51

This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations



## Additional ratings for your home



## Breakdown of property's energy performance

Each feature is assessed as one of the following:



Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m <sup>2</sup> K	Very Good
Roof	Average thermal transmittance 0.14 W/m <sup>2</sup> K	Very Good
Windows	High performance glazing	Good
Main heating	Room heaters, electric	Very Poor
Main heating controls	Programmer and appliance thermostats	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Excelent lighting efficiency	Very Good
Air tightness	Air permeability [AP50] = 5.0 m <sup>3</sup> /h.m <sup>2</sup> (assumed)	Good

## Recommendations





The recommended measures provided below will help to improve the energy efficiency of the dwelling. To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed. Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

## Estimated energy costs of the dwelling

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total energy cost if all recommended measures named above were installed.

		Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting		£29	£29	
Heating		£540	£540	
Hot Water		£152	£152	
New Technologies e.g. Impact of PV		£0	£0	
<b>TOTAL</b>		<b>£721</b>	<b>£721</b>	

## Estimated energy use and potential savings



Space Heating  
**1900**  
kWh per year



Water Heating  
**535**  
kWh per year

## About this document

Created by:

Company/Trading name:

Phone number:

Email address:

### Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.

This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.

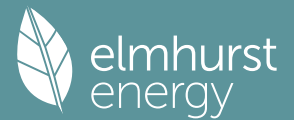
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.

The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

## Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO <sub>2</sub> )	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.

# Dwelling Sign Off Report



Property Reference	New Unit	Issued on Date	08/07/2025
Assessment Reference	New Unit - Be Green Dimplex	Prop Type Ref	Detached Flat
Property			

SAP Rating	71 C	DER	8.96	TER	
Environmental	94 A	% DER < TER			N/A
CO <sub>2</sub> Emissions (t/year)	0.39	DFEE	51.99	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	91.87	TPER	

Assessor Details	Mr. Aharon Horwich	Assessor ID	AV59-0001
Client	A, A		

This report should be used for a client to confirm key assessment details for production of Energy Performance Certificates and should be retained as documentary evidence. It cannot be used in lieu of a BREL/BRWL/Compliance report for demonstrating Building Regulation compliance.

## Section 1: Dwelling Information

### Dwelling Address (Please confirm final postal address and post code of the dwelling.)

House Name		
House Number		
Postcode		
Street		
Town		
County		

### Dwelling Orientation (Please confirm orientation of main entrance door of the dwelling.)

Comments

### Terrain Type

### Property Type

Comments

### Electricity Tariff

Smart electricity meter fitted

Smart gas meter fitted

Comments

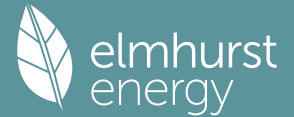
## Section 2: Dwelling Construction Details

### External Walls

Description	<input type="text" value="External Wall"/>		
Type	<input type="text" value="Steel Frame"/>		
Construction	<input type="text" value="Other"/>		
U-value	<input type="text" value="0.18"/>	W/m <sup>2</sup> K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	<input type="text" value="41.45"/>	m <sup>2</sup>	

Description	<input type="text" value="Corridor Wall"/>		
Type	<input type="text" value="Steel Frame"/>		
Construction	<input type="text" value="Other"/>		
U-value	<input type="text" value="0.18"/>	W/m <sup>2</sup> K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	<input type="text" value="3.13"/>	m <sup>2</sup>	

# Dwelling Sign Off Report



## Comments

## External Roofs

Description	External Roof 1	
Type	External Flat Roof	
Construction	Other	
U-value	0.14	W/m <sup>2</sup> K U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	49.90	m <sup>2</sup>

## Comments

## Opening Types

Description	Data Source	Type	Glazing	G-value	Frame Type	U-Value (W/m <sup>2</sup> K)
Glazing	Manufacturer	Window	Double glazed	0.55		1.30
Door	Manufacturer	Solid Door		0.00		1.30

## Comments

## Openings

Name	Opening Type	Location	Orientation	Area (m <sup>2</sup> )
D W	Door	Corridor Wall	North	1.95
W E	Glazing	External Wall	East	12.05

## Comments

## Thermal Bridging

	Default
Y-value	0.200

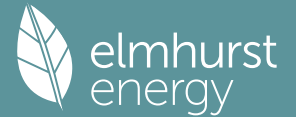
## Comments

Where specific construction details have been used documentary evidence should be provided to the SAP assessor, usually in the form of signed checklists.

## Pressure Testing

	Yes	
Designed AP <sub>50</sub>	5.00	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

# Dwelling Sign Off Report



Where an air pressure test has been carried out a copy of the test certificate should be forwarded to the SAP assessor.

Comments

## Section 3: Dwelling Systems

### Fans, Open Fireplaces, Flues

Number of open chimneys	<input type="text" value="0"/>
Number of open flues	<input type="text" value="0"/>
Number of chimneys/flues attached to closed fire	<input type="text" value="0"/>
Number of flues attached to solid fuel boiler	<input type="text" value="0"/>
Number of flues attached to other heater	<input type="text" value="0"/>
Number of blocked chimneys	<input type="text" value="0"/>
Number of intermittent extract fans	<input type="text" value="2"/>
Number of passive vents	<input type="text" value="0"/>
Number of flueless gas fires	<input type="text" value="0"/>

Comments

### Fixed Cooling System

Comments

### Lighting

No Fixed Lighting

Name	Efficacy (lm/W)	Power (W)	Capacity (lm)	Count
Lighting 1	185.00	10.00	1850.00	5

Comments

### Main Heating 1

	<input type="text" value="SAP table"/>	
Fuel Type	<input type="text" value="Electricity"/>	
Winter Efficiency	<input type="text" value="100.00"/>	%
Summer Efficiency	<input type="text" value="349.41"/>	%
Model Name	<input type="text"/>	
Manufacturer	<input type="text"/>	
System Type	<input type="text"/>	
Flue Type	<input type="text"/>	
Fan Assisted Flue	<input type="text" value="No"/>	
Heat Emitter	<input type="text"/>	

# Dwelling Sign Off Report



Flow Temperature

Flow Temperature Value

Comments

## Heating Controls

Description

Boiler Interlock

Delayed Start Stat

PCDF Control Description

Comments

## Main Heating 2

Fuel Type

Winter Efficiency  %

Summer Efficiency  %

Model Name

Manufacturer

System Type

Flue Type

Fan Assisted Flue

Heat Emitter

Flow Temperature

Flow Temperature Value

Comments

## Heating Controls

Description

Boiler Interlock

Delayed Start Stat

PCDF Control Description

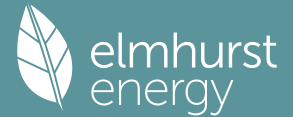
Comments

## Secondary Heating

## Water Heating System

Water Heating

# Dwelling Sign Off Report



Supplementary Immersion   
SAP Code   
Water use <= 125 l/p/day   
Cold Water Source   
Number of baths

Comments

**Hot Water Cylinder**   
Independent Time Control   
Cylinder Stat   
Insulation Type   
Cylinder Volume  L  
Measured Loss  kWh/day  
Pipes insulation

Comments

## Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system + pump	7.00		No	

Comments

## Waste Water Heat Recovery System

Comments

### Section 4: Dwelling Renewable Energy

**Photovoltaic Unit**

### Section 5: Declaration

I confirm to the best of my knowledge the details provided in this report are an accurate representation of how the dwelling has been constructed.

Signed .....

Date .....