

ENERGY & SUSTAINABILITY ASSESSMENT

THE GARAGES

PROPERTY ADDRESS

FERRYMORE ST RICHARD'S COURT HAM TW10 7NS

DATE

March 22

PREPARED BY EAL Consult



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1.EXECUTIVE SUMMARY

This Sustainability statement has been prepared to support the planning application for the the demolition of the garages and the construction of two 3 storey townhouses with parking and gardens in Ham, west of London and south of Richmond but north of Kingston upon Thames. The strategy highlights how the proposed development will promote sustainability throught both design and operation and summarises the relevant regulatory and planning policies applicable and how the relevant policy targets will be addressed and achieved.

The strategy reponds to the UK Planning and regulatory framework, the National Planning Policy Framework 2021, the New London Plan 2021 and the Borough of Richmond Upon Thames Local Plan (2018).

In accordance with the Energy Hierarchy detailed within The New London Plan 2021, this statement outlines an overall commitment to reducing energy consumption under occupancy through the adoption of a 'Fabric First' principle, which will seek enhanced insulation standards and improved heating and lighting efficiencies in comparison to the standard requirements of Approved Document Part L1A 2013. Further carbon emission reduction can be achieved by using renewables (Air Source Heat Pumps).

Energy Effcicency & Carbon Reduction:

- Passive design principles including a high level of insulation and reduced air permeability to deliver Part L1A 2013 compliant Building in absence of renewable technologies. It will achieve **3.7%** reduction in carbon emissions over Part L1A baseline.
- Air Source Heat Pumps / Photovoltaic panels have been proposed for the specific scheme and will deliver a further **36.3%** reduction in regulated carbon emissions over Part L1A baseline when utilising the proposed carbon factor changes to building Regulations Part L.

Material and waste management:

- Minimising the use of virgin materials during construction by recycling and reusing where feasible.
- Low waste benchmark levels will be targeted during construction with requirements identifying that the diversion of waste from landfill is to be achieved by the contractor.

Recommendation and Results:

This report demonstrates that the proposed development by incorporating the measures above can achieve an average carbon emission reduction of **40.1% with the use of:**

• Air Source Heat Pumps.

The following tables demonstrate the carbon emissions and savings.

	Regulated Carbon di (Tonnes CO2 per annur	
	Regulated	Total
Building Regs Notional Development	4.36	5.23
After Energy demand Reduction	1.2	5.04
After Renewables	2.61	3.14

Table 1. Carbon Dioxide emissions after each stage of the Energy Hierarchy

Table 2. Carbon Dioxide Savings from each stage of the Energy Hierarchy

	Regulated Carbon dioxide savings (Tonnes CO ₂)	% Reduction
Savings from energy efficiency measures	0.16	3.7%
Savings from Renewables	1.58	36.3%
Total savings	1.75	40.1%

2.INTRODUCTION

Site description

The site is located in Ham, west of London and south of Richmond but north of Kingston upon Thames. The block of garages stand independently from the retail units and duplexes of St. Richards Court in a housing estate probably built in the 1960's and 70's and are currently unused. The proposed development comprises the demolition of the garages and the construction of two 3 storey townhouses with parking and gardens.



Figure 1. Site Location

Methodology

This energy assessment outlines the energy demand from the development together with the associated CO_2 emissions, using the present Building Regulations Part L as a baseline. It demonstrates how the emissions from energy use in the development will be reduced through energy efficiency measures.

The proposed scheme is required to achieve carbon emission reduction principles in accordance with the UK Planning and regulatory framework,

The methodology employed to determine the potential CO₂ savings is in accordance with the threestep Energy Hierarchy.

- Be Lean Improve the energy efficiency of the scheme;
- **Be Clean** Supply as much of the remaining energy requirement with low carbon; technologies such as district heating if available or combined heat and power (CHP); and
- **Be Green** Offset a proportion of the remaining carbon dioxide emissions by using renewable technologies.

The government approved Standard Assessment Procedure (SAP) methodology software (2013) has been used to determine the CO_2 emissions and energy requirements. It compares CO_2 emissions from regulated energy use (DER) with those of an equivalent dwelling built to Part L1A 2013 (TER), a notional dwelling of the same size and shape. These calculations do not include emissions from cooking or appliances.

Opportunities for incorporating features into the development that contribute to the objectives of sustainable development were explored during the design process, to ensure that where possible, the proposals achieve best practice.

3. PLANNING POLICY CONTEXT

National Planning Policy Framework 2021 – emphasised the concept of sustainable development by encouraging local authorities to adopt proactive strategies to mitigate and adapt to climate change. It recommends the move to a low carbon future by:

- Avoiding increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
- Contributing to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.
- To help increase the use and supply of renewable and low carbon energy and heat, plans should:
 - provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
 - consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
 - identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for colocating potential heat customers and suppliers.

The London Plan 2021 provides the strategic framework for an integrated socio-economic, transportation and environmental development plan across the capital to 2050. The Plan seeks to ensure new developments are designed to enable the efficient use of energy and support the development of sustainable energy infrastructure to produce energy more efficiently. It sets out a range of policies that apply to new developments.

Policy SI 2 Minimising Greenhouse Gas Emissions:

- A. Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy: a) Be lean: use less energy and manage demand during operation, b) Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly, c) Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy onsite.
- B. Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.
- C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either: 1) through a cash in lieu contribution to the borough's carbon offset fund, or 2) off-site provided that an alternative proposal is identified, and delivery is certain.
- D. Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

- E. Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.
- F. Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

9.2.1 The Mayor is committed to London becoming a zero-carbon city. This will require reduction of all greenhouse gases, of which carbon dioxide is the most prominent. London's homes and workplaces are responsible for producing approximately 78 per cent of its greenhouse gas emissions. If London is to achieve its objective of becoming a zero-carbon city by 2050, new development needs to meet the requirements of this policy. Development involving major refurbishment should also aim to meet this policy.

9.2.2 The energy hierarchy should inform the design, construction, and operation of new buildings. The priority is to minimise energy demand, and then address how energy will be supplied and renewable technologies incorporated. An important aspect of managing demand will be to reduce peak energy loadings.

London Borough of Richmond Upon Thames – Local Plan 2018.

Policy LP 20 B1.

Minimise internal heat generation through energy efficient design

Policy LP 22

Developments will be required to achieve the highest standards of sustainable design and construction to mitigate the likely effects of climate change. Applicants will be required to complete the following:

- 1. Development of 1 dwelling unit or more, or 100sqm or more of non-residential floor space (including extensions) will be required to complete the Sustainable Construction Checklist SPD. A completed Checklist has to be submitted as part of the planning application.
- 2. Development that results in a new residential dwelling, including conversions, change of use, and extensions that result in a new dwelling unit, will be required to incorporate water conservation measures to achieve maximum water consumption of 110 litres per person per day for homes (including an allowance of 5 litres or less per person per day for external water consumption).
- 3. New non-residential buildings over 100sqm will be required to meet BREEAM 'Excellent' standard.
- 4. Proposals for change of use to residential will be required to meet BREEAM Domestic Refurbishment 'Excellent' standard (where feasible).

Reducing Carbon Dioxide Emissions

Developers are required to incorporate measures to improve energy conservation and efficiency as well as contributions to renewable and low carbon energy generation. Proposed developments are required to meet the following minimum reductions in carbon dioxide emissions:

- 1. All new major residential developments (10 units or more) should achieve zero carbon standards in line with London Plan policy.
- 2. All other new residential buildings should achieve a 35% reduction.

3. All non-residential buildings over 100sqm should achieve a 35% reduction. From 2019 all major non residential buildings should achieve zero carbon standards in line with London Plan policy.

Targets are expressed as a percentage improvement over the target emission rate (TER) based on Part L of the 2013 Building Regulations. This should be achieved by following the Energy Hierarchy: 1. Be lean: use less energy 2. Be clean: supply energy efficiently 3. Be green: use renewable energy

4.ENERGY STRATEGY

The Energy strategy for the proposed housing is based on the Building Regulations Part L1A; it adopts a set of principles to guide design and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. It seeks to incorporate energy efficiency through the approach detailed below.

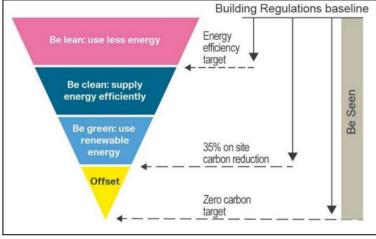


Figure 2. Energy Hierarchy

Be 'Lean' - Demand Reduction

The building fabric performance and engineering systems have been optimised in order to use less energy prior to the inclusion or consideration of Low and Zero Carbon (LZC) Technology.

Through passive design measures, efficient building fabric and engineering systems the building is estimated to achieve **3.7%** reduction in annual regulated CO_2 emissions over Part L1A benchmark, therefore demonstrating compliance with Building Regulations Through passive means alone without the utilisation of renewable technologies.

Passive Design Measures:

Fabric Performance - The fabric performance values aim to reduce unwanted heat loss and heat gains, whilst maintaining a comfortable internal environment.

Thermal element	Part L1A Minimum				
mermarelement	Standard				
Wall	0.30W/m ² k				
Roof	0.20 W/m ² k				
Floor	0.25 W/m ² k				
Glazing	1.2 W/m ² k				
Doors	1.2 W/m ² k				

Table 3. Fabric energy Efficiency Standard

The heat loss of different building elements is dependent upon their U –value. A building with low U values provides better levels of insulation and reduced heating demand.

The development will incorporate high levels of insulation and efficient glazing; thereby reduce demand for space heating. The table below shows the U values for the development and the associated improvements over Building Regulations.

Element	Standard	Specification
Wall	0.30 W/m²k	0.14W/m²k
Floor	0.25W/ m²k	0.13W/m²k
Roof	0.2 W/ m²k	0.11 W/ m²k
Glazing	1.4 W/ m²k	1.1 W/ m²k

Table 4. Energy Efficient design Specification

Space Heating & Cooling - Space heating could be provided by underfloor heating for each dwelling;

Efficient Lighting and Controls - Throughout the development natural lighting will be optimised. The development will also incorporate low energy light fittings throughout. All light fittings will be specified as low energy lighting and will accommodate compact fluorescent (CFLs) or fluorescent luminaries only.

Ventilation - The use of natural ventilation is proposed for dwelling.

Domestic hot water (DHW) system – domestic hot water is supplied for dwelling via the air source heat pump and cylinder.

Be 'Clean' – Supply Energy Efficiently

The Be Clean step of the energy hierarchy refers to the use of 'Clean energy supply'. This includes, but is not limited to, the use of Combined Heat and Power (CHP) and District Heat Networks. Policy TP1 seeks for new development to promote the use of CHP and district heating.

In light of the small scale nature of the proposed development, it is apparent that the use of CHP is also technically and financially unviable in this instance.

Be 'Green' - Renewable Energy

Once energy demand reduction measures have been applied, methods for generating low and zero carbon energy can be assessed. The following renewable technologies can be considered for the project: Biomass, Water source heat pump, air source heat pump, Wind energy and solar photovoltaic panels.

Table 5. Renewable Technologies Feasibility Table

Technology	Pros	Cons
Biomass Heating A biomass system designed for wood pellets, which have a high-energy content, would fuel this development.	 Less volume of storage Less maintenance and produce considerably less ash residue 	 Nox Emissions which may impacts High Costs Not suitable for the project
Ground Source Heat Pump It circulates a mixture of water and antifreeze around a loop of pipe, called a ground loop, which is buried in the garden. Heat from the ground is absorbed into the fluid and passes through a heat exchanger into the heat pump	 Use all through the year 	 High Costs Not suitable for this project
Air Source Heat Pump They are an efficient and environmentally- friendly way of heating using air drawn freely from the atmosphere. They operate rather like a refrigerator in reverse, absorbing heat from the air into a working fluid which is passed into a compressor where its temperature is increased before it is transferred into the heating and hot water circuits of the building	 Can generate less CO₂ than conventional heating systems. Cheaper Provides heating and hot water Less maintenance Can be used as air- conditioning in the summer 	 Needs electricity Can be noisy
Wind Turbines Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings.	 Cheaper Less CO₂ 	 Local wind speeds in the area is likely to be below the level generally required for investment in large wind turbines. Noise and signal interference. Detrimental aesthetic impact

Solar Photovoltaic Panels (PV) Photovoltaic panels extract the energy of the sun to generate electricity. They operate most efficiently when oriented to the south and are inclined to about 35 degrees.	 Cheaper Less CO₂ No input power in order to generate electricity. 	 Not enough space
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Renewable Technologies Feasibility Review Conclusion

The renewable energy sources that have been reviewed for this project are Biomass Heating, Ground Source Heat Pump, Air Source Heat Pump, Domestic Wind Turbine and Solar Photovoltaic Panels (PV).

On review of the above technologies, it has been concluded that the use of an air source heat pump is to be incorporated in the design because it achieves a CO2 percentage reduction of **36.3%** contributing to an overall reduction **of 40.1%** in carbon emissions.

Be Seen: Post-Construction Monitoring

To truly achieve net zero-carbon buildings we need to have a better understanding of their actual operational energy performance. To reduce the 'performance gap' the fourth stage, 'be seen', is a critical element in minimising greenhouse gas emissions and keeping running costs low.

Quality assurance mechanisms and commitments that will be considered as part of the energy strategy are:

- Gaining quality assurance accreditation (e.g. Heat Trust)
- Following quality standards (e.g. CIBSE Code of Practice)
- Transparent billing, including separation of the ongoing maintenance and capital replacement aspects of the standing charge
- Aftercare support (e.g. BREEAM Man 05 Aftercare)
- Heat tariffs options given to occupants
- Consumer choice for metering arrangements at no extra cost (e.g. Prepayment Meters (PPM)
- Thermal storage linked to pricing signals and renewable generation

5.SUSTAINABLE DESIGN

The proposed project incorporates sustainable design and construction measures capable of mitigating and adapting to climate change to meet future needs. This section details site-specific initiatives which demonstrate how the conversion helps to meet the sustainability objectives set out in the National Planning Framework 2021.

Energy Use and Pollution

The design of the development has taken into consideration day lighting to habitable spaces to improve the wellbeing of occupants. Good levels of daylight will offer occupants a pleasant and highly valued connection to the outdoors and plenty of natural light. It will also reduce the use of artificial lighting and therefore energy use. All light fittings will be specified as low energy lighting. No external lighting is required. The location and orientation of windows help to create a design that avoids overheating in the summer.

Pollution: Air, Noise and Light

The layout of the development can provide good internal air quality for habitable areas but not too much so as to waste heat. The use of openable windows will create horizontal airflow. By achieving a good naturally ventilated building the energy demand for air conditioning and mechanical ventilation will thereby be eliminated within the development.

The development will not increase the air pollution of the area by reducing as a start, its energy consumption, which in turn will reduce emissions that lead to air pollution. Other measures will include:

- a. Use of eco-friendly building materials
- b. Non-toxic paints
- c. Installation of energy efficient appliances and devices
- d. Use of renewable technologies

Light pollution can best be described as artificial light that is allowed to illuminate or intrude upon areas not intended to be lit. Light in the wrong place at the wrong time can be intrusive.

Intrusive light is over bright or poorly directed lights shining onto neighbouring property which affect the neighbours' right to enjoy their property. Therefore, the proposal will incorporate lighting measures in order to avoid causing a nuisance.

Water: Water Efficiency

In domestic and non-domestic buildings, the demand for water can be reduced as much as 50% using a variety of simple and innovative strategies that are integrated into the plumbing and mechanical systems. In order to reduce water consumption the proposed development will include efficient fixtures with low flow rates. Total internal water consumption will not exceed 105 litres/person/day.

Schedule Appliance Water Consumption						
Appliance	Flow rate or Capacity	Total Litres				
WC	Dual flush WC 4/2.6 litre	14.72				
Basin	5.98					
Shower	Shower 8 litres/minute flow					
Bath	160 litres	25.60				
Sink	4 litres/min	14.13				
W/machine	Default used	16.66				
Dish Washer Default used		3.90				
		104.99				

Table 6. Water Fittings Standards

Pollution

All contractors would be required to sign up to the nationally recognised Considerate Constructors Scheme which requires, amongst other things that dust emissions, potential noise pollution, impacts on water quality and the potential for ground contamination are minimised during demolition and construction. The Contractor would also be obliged to adhere to a site specific Code of Construction Practice to reduce potential nuisance effects.

Waste

A bin store has been included by the entrance for the residents exclusive use. Composting is also recommended to reduce the overall household.

Flood Risk

The development site is located in a Low Flood Risk Area on the Environment Agency Flood Risk Map.

Biodiversity

The proposed development will incorporate measures to support and enhance the environment through consideration of the existing site, including measures to mitigate the impact of the development and enhance site biodiversity.

6.Circular economy

Materials efficiency

Materials can have a significant impact on environmental performance, both in construction but also ongoing use. Materials used for the building will have lower environmental impacts over their lifecycle. This applies to the materials used in the external walls, roof and glazing. This extends to elements of the materials category such as the basic building materials (internal walls) and the finishing elements (fascia, skirting, and furniture).

It is expected that all timber used in the development will come from a legal Source (FSC Scheme). At least 80% of the building materials will be responsibly sourced and will use suppliers who can provide an EMS certificate or equivalent. Materials rated with an A or B in the BRE Green Guide to Specification will be preferred.

Other measures will be implemented:

- The reuse of existing materials from the demolition of existing buildings
- At least 20% of the total value of materials used should derive from recycled and reused content in the products and materials selected;
- Steel will have a high recycled content;
- Concrete will have a Ground Granulated Blast Furnace Slag (GGBS) value of 50%.

Resource efficiency

• Pre-demolition audit to be carried out and target benchmark of ≤ 11.1 tonnes of construction waste per 100m2;

Diversion of waste from landfill

- Where possible, segregation of recyclable and non-recyclable material will be employed for all waste generated throughout the construction process. Furthermore, material will be re-used on-site where feasible;
- Pre-fabrication of materials/elements such as bathroom pods, pipework and riser materials will be considered;
- Reusable packing solutions with key product manufacturers will be explored at the earliest opportunity. Solutions may include flat pallets, bulk bags, steel stillages and returnable cable drums;
- Construction waste minimum 80% diversion from landfill rate;
- Demolition waste minimum 90% diversion from landfill rate;
- Operational waste Target diversion from landfill rate to be set.

7.CONCLUSION

The development has been designed to exceed Part L1A building regulations requirements. In line with the national and local policies, regulated CO₂ emissions from the development will be reduced by **40.1%** from the notional emissions once energy efficiency measures and lean measures are taken into account.

In order to achieve the required carbon emissions reduction, the report concludes and proposes the use of energy efficient measures outlined in the section 4 of this report.

An appraisal of the proposed development has been undertaken against key sustainability objectives identified from relevant policy guidance. The framework for the appraisal was guided by the National Plan. This process has ensured that the development responds to the sustainable development objectives that are relevant to the area. Key sustainability initiatives in ecology, waste management, water, health and wellbeing, materials, pollution and Surface water management have been incorporated in the design of the proposed Development.

8.APPENDIX

I. SAP Calculations

Project Information Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 1
		-	The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m²)	Av. Storey height (m)	Volume (m³)	
Ground floor (1)	49.29	2.50	123.22	(3a)
First floor	43.20	2.80	120.96	(3b)
Second floor	43.20	2.80	120.96	(3c)
	135.69			(4)
			365.14	(5)

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2. Ventilation rate

2. 70/1		uic									m³ per ho	our
							main + s	eondar	y + othe	er		
Numbo	r of ohim	nove					heating $0 + 0 + 0$		x 40		0.00	(6a)
	Number of chimneys Number of open flues								x 40 x 20		0.00	(6a) (6b)
		mittent fa	ans				0 + 0 + 0 5		x 10		50.00	(7a)
		ive vents					0		x 10		0.00	(7b)
	•	ess gas f					0		x 40		0.00	(7c)
											Air chang	ges per hour
											0.14	(8)
Pressu	re test, r	esult q50)						4.00			(17)
Air perr	neability										0.34	(18)
											2.00	(19)
											0.85	(20)
		•	•	ter factor							0.29	(21)
				nly wind s	-			γ				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
]][13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	vind spe	ed)				10110	(120)
0.37	0.36	0.35	0.32	0.31	0.27	0.27	0.26	0.29	0.31	0.32	0.34	
L		IL	π	JL_JL	J	JL	JLJL		JL_JL	R	3.76	(22b)
		ural vent inge rate		ntermitter	nt extrac	t fans						、 <i>,</i>
0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)
0.57	0.50	0.50	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.00	(20)

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	nd heat lo s Gross area, m²	ss parameter Openings m²	Netarea A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double argon filled, low-E soft coat (South) FRONT	glazed,		7.120	1.05 (1.10)	7.50			(27)
Window - Double- argon filled, low-E soft coat (East) SIDE	-		4.640	1.05 (1.10)	4.89			(27)
Window - Double- argon filled, low-E soft coat (North) REAR	-		6.720	1.05 (1.10)	7.08			(27)
Solid door FRONT			2.270	1.10	2.50			(26)
Full glazed door -			7.510	1.10	8.26			(26)
Double-glazed, ar low-E, En=0.1, sc (North) REAR								
Rooflight at 70° or Double-glazed, ar low-E, En=0.1, sc (n/a) ROOF	gon filled,		2.170	1.05 (1.10)	2.29			(27)
Rooflight at 70° of Double-glazed, ar low-E, En=0.1, so (n/a) ROOF	gon filled,		1.320	1.05 (1.10)	1.39			(27)
Walls EXTERNAL#W		DOODS	125.64	0.14	17.59	70.00	8794.80	(29)
Ground floors		DOORS	49.29	0.13	6.41	110.00	5421.90	(28)
UNDERGROUN Flat roofs			3.92	0.11	0.43	9.00	35.28	(30)
GF REAR #ROC Flat roofs			41.88	0.11	4.61	9.00	376.92	(30)
MAIN ROOF #R	OOFLIGHT	S	80.15	0.00	0.00	180.00	14427.00	
SOLID Internal floor FF			43.20	0.00	0.00	18.00	777.60	
Internal floor SF			43.20	0.00	0.00	18.00	777.60	
Internal ceiling FF			43.20	0.00	0.00	9.00	388.80	
Internal ceiling GF			43.20	0.00	0.00	9.00	388.80	

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SAP 2012 worksheet for New dwelling as c	designed - calculation of energy ratings
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	er heatin ed occup		y require	ements							kWh/yea 2.91
	average		usage ir	n litres pe	er day Vd	l,average	9				108.71
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres p	ber day f	or each r	nonth	Л			1	Л	
119.58	115.23	110.88	106.54	102.19	97.84	97.84	102.19	106.54	110.88	115.23	119.58
Energy	content o	of hot wat	ter used								
177.33	155.10	160.05	139.53	133.89	115.53	107.06	122.85	124.32	144.88	158.15	171.74
	content (tion loss	annual)									1710.43
26.60	23.26	24.01	20.93	20.08	17.33	16.06	18.43	18.65	21.73	23.72	25.76
	r volume						300.00				
	cturer's c		cylinder l	oss facto	or (kWh/o	day)	2.14 0.5400				
	ature Fac lost from		ar cylinde	r (k)/h/c	hav)		0.5400				1.16
	orage los		, cynnac		ay)						1.10
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Net stor	age loss	Л	1		,	Л	Л		J	Л	
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Primary	loss	Л		л	я			A			
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26
Total heat required for water heating calculated for each month											
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Output f	from wate	er heater	for each	month, l	<wh moi<="" td=""><td>nth</td><td></td><td></td><td></td><td></td><td></td></wh>	nth					
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Heat ga	ins from	water he	ating, kV	/h/month	<u></u> ו						2406.12
106.23	94.26	100.48	92.14	91.79	84.16	82.87	88.12	87.08	95.44	98.33	104.37
L			IL	J	J	JL	JL	J	JL	JL	

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5. Internal gains

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Metabolic gains, Watts 174.50 </th <th>••••••••</th> <th>iai gaint</th> <th>•</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	••••••••	iai gaint	•									
174.50 176.51 166.24 176.61	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains 68.70 61.02 49.63 37.57 28.08 23.71 25.62 33.30 44.70 56.75 66.24 70.61 Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 Pumps and fans gains 3.00 3.00 3.00 3.00 3.00 3.00 3.00 3.00	Metabol	ic gains,	Watts		~							
68.70 61.02 49.63 37.57 28.08 23.71 25.62 33.30 44.70 56.75 66.24 70.61 Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50
Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36	Lighting	gains			~							
454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36 55	68.70	61.02	49.63	37.57	28.08	23.71	25.62	33.30	44.70	56.75	66.24	70.61
Cooking gains 55.36 55	Appliand	ces gains	5		~							
55.36 55.36 <td< td=""><td>454.41</td><td>459.13</td><td>447.24</td><td>421.95</td><td>390.02</td><td>360.00</td><td>339.95</td><td>335.24</td><td>347.12</td><td>372.42</td><td>404.35</td><td>434.36</td></td<>	454.41	459.13	447.24	421.95	390.02	360.00	339.95	335.24	347.12	372.42	404.35	434.36
Pumps and fans gains 3.00	Cooking gains											
3.00 3.00	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36
Losses e.g. evaporation (negative values) -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 Water heating gains 142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	Pumps a	and fans	gains									
-116.34 -116.34	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Water heating gains 142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	Losses e.g. evaporation (negative values)											
142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34
Total internal gains	Water heating gains											
	142.79	140.27	135.06	127.97	123.37	116.89	111.38	118.44	120.94	128.28	136.57	140.29
782.43 776.95 748.46 704.02 657.99 617.13 593.48 603.50 629.29 673.98 723.68 761.79	Total internal gains											
	782.43	776.95	748.46	704.02	657.99	617.13	593.48	603.50	629.29	673.98	723.68	761.79

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (South) FRONT	0.9 x 7.120 46.75	0.63 x 0.80	0.77	116.2638	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (East) SIDE	0.9 x 4.640 19.64	0.63 x 0.80	0.77	31.8294	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 6.720 10.63	0.63 x 0.80	0.77	24.9577	
Solid door FRONT	0.9 x 2.270 0.00	0.00 x 0.70	0.77	0.0000	
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 7.510 10.63	0.63 x 0.80	0.77	27.8917	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 2.170 26.00	0.63 x 0.80	1.00	25.5921	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 1.320 26.00	0.63 x 0.80	1.00	15.5676	
Total solar gains, January				242.10	(83-1)
Solar gains 242.10 439.16 668.69 936.81 1144.24 11	76.68 1117.58 957.2	9 761 03 503	97 294.94	203.94	(83)
Total gains	70.00 1117.00 007.2	.0 / 01.00 000.	01 204.04	200.04	(00)
1024.53 1216.11 1417.14 1640.83 1802.23 17	93.81 1711.06 1560	.79 1390.32 117	7.94 1018.62	965.73	(84)

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7 Mean internal temperature

Temper	n <i>interna</i> ature dui system r	ring heati	ing perio	ds in the l	living are	a, Th1 (°	C)				21.00 0.75	(8
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau				R	P			-R				
57.58	57.70	57.82	58.37	58.48	58.97	58.97	59.06	58.78	58.48	58.27	58.04	
alpha				·								
4.84	4.85	4.85	4.89	4.90	4.93	4.93	4.94	4.92	4.90	4.88	4.87	
Utilisatio	on factor	for gains	forliving	area								
0.99	0.98	0.95	0.87	0.71	0.52	0.38	0.43	0.68	0.92	0.98	0.99	(8
Mean internal temperature in living area T1												
20.10	20.26	20.48	20.73	20.88	20.93	20.94	20.94	20.90	20.69	20.34	20.07	(8
Temperature during heating periods in rest of dwelling Th2												
19.99	19.99	19.99	20.00	20.00	20.01	20.01	20.01	20.01	20.00	20.00	20.00	(8
Utilisatio	on factor	for gains	for rest	of dwellir	ng							
0.99	0.98	0.94	0.83	0.65	0.44	0.29	0.34	0.60	0.89	0.98	0.99	(8
Mean in	ternal ter	mperatur	re in the r	est of dw	elling T2	2						
18.80	19.02	19.34	19.68	19.86	19.92	19.93	19.93	19.90	19.64	19.16	18.76	(9
Living area fraction (38.72/135.69)0.29Mean internal temperature (for the whole dwelling)							(9					
19.17	19.37	19.66	19.98	20.15	20.21	20.22	20.22	20.18	19.94	19.50	19.14	(9
Apply adjustment to the mean internal temperature, where appropriate												
19.17	19.37	19.66	19.98	20.15	20.21	20.22	20.22	20.18	19.94	19.50	19.14	(9

8. Space heating requirement

	••	9.09	•••••								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatic	on factor	for gains							λ		
0.99	0.97	0.94	0.83	0.66	0.46	0.31	0.36	0.62	0.89	0.98	0.99
Useful g	ains										
1012.04	1183.65	1325.45	1368.29	1185.74	819.51	533.69	561.22	861.51	1050.32	993.29	956.59
Monthly	average	external	temperat	ture							
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	s rate for	mean in	ternal tei	mperatui	е						
2251.9	2186.9	1985.21	1655.37	1260.60	829.55	534.88	563.58	902.48	1391.94	1854.88	2243.6
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space heating requirement for each month, kWh/month											
922.43	674.20	490.86	206.69	55.70	-	-	-	-	254.16	620.34	957.53
	ace heati	• •		•		ar) (Octo	ber to Ma	ay)			4181.92
Space h	eating re	quireme	nt per m²	² (kWh/m	²/year)						30.82

8c. Space cooling requirement - not applicable

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9a. Energy requirements

kWh/year							
No secondary heating system selected1.0000(2Fraction of space heat from main system(s)90.90%(2							
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec							
Space heating requirement							
922.43 674.20 490.86 206.69 55.70 254.16 620.34 957.53 ((98)						
Appendix Q - monthly energy saved (main heating system 1)							
0.00 0.00 0.00 0.00 0.00 0.00 0	(210)						
Space heating fuel (main heating system 1)							
1014.77 741.69 540.00 227.39 61.28 279.61 682.45 1053.38 (2	(211)						
Appendix Q - monthly energy saved (main heating system 2)							
0.00 0.00 0.00 0.00 0.00 0.00 0	(212)						
Space heating fuel (main heating system 2)							
0.00 0.00 0.00 0.00 0.00 0.00 0	(213)						
Appendix Q - monthly energy saved (secondary heating system)							
	(214)						
Space heating fuel (secondary)							
0.00 0.00 0.00 0.00 0.00 0.00 0	(215)						
Water heating							
Water heating requirement							
236.42 208.47 219.13 196.71 192.97 172.71 166.14 181.94 181.50 203.97 215.33 230.83	(64)						
Efficiency of water heater 80.20 (2	(216)						
88.49 88.12 87.30 85.35 82.37 80.20 80.20 80.20 80.20 85.80 87.88 88.60 (2	(217)						
Water heating fuel							
267.17 236.56 251.00 230.48 234.27 215.35 207.16 226.85 226.31 237.71 245.03 260.51 (2	(219)						
Annual totals kWh/year							
	(211)						
	(215)						
	(219)						
Electricity for pumps, fans and electric keep-hot	(000)						
	(230c)						
	(230e) (231)						
	(232)						
Energy saving/generation technologies	· · ·						
PVs 0.80 x 2.000 x 950.616 x 1.000 1520.986							
PVs 0.80 x 0.000 x 0.000 x 0.500 0.000							
PVs 0.80 x 0.000 x 0.000 x 0.500 0.000 1520.986 (2	(233)						
Appendix Q -	(200)						
	(236a)						
Energy used (): 0.000 (2	(237a)						
Total delivered energy for all uses6478.33	(238)						

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10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	4600.569	3.480	160.10	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2838.41	3.480	98.78	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	485.335	13.190	64.02	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	1520.986	13.190	-200.62	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			252.17	(255)
11a. SAP rating				
······································			0.42	(256)

	0.42	(200)
	0.59	(257)
SAPvalue	91.82	
	92	(258)
SAP band	Α	

12a. Carbon dioxide emissions

	Energy	Emission factor	Emission	-
	kWh/year	kg CO2/kWh	kg CO2/y	ear
Space heating, main system 1	4600.57	0.216	993.72	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	2838.41	0.216	613.10	(264)
Space and water heating			1606.82	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	485.33	0.519	251.89	(268)
Electricity generated - PVs	-1520.99	0.519	-789.39	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1108.24	(272)
			kg/m²/yea	ır
CO2 emissions per m ²			8.17	(273)
Elvalue			91.78	(273a)
El rating			92	(274)
El band			Α	

Calculation of stars for heating and DHW

Main heating energy efficiency	
Main heating environmental impact	
Water heating energy efficiency	
Water heating environmental impact	

(3.48 / 0.9090) x (1 + (0.29 x 0.25)) = 4.1059, stars = 4 (0.2160 / 0.9090) x (1 + (0.29 x 0.25)) = 0.2549, stars = 4 3.48 / 0.8456 = 4.1154, stars = 4 0.2160 / 0.8456 = 0.2554, stars = 4

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Project Information

Building type Semi-detached house

Reference Date Email:	1 March NONE	2022 Project	House 1 The Garages Ferrymore St Richard's Court HAM TW107NS
			10000

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.05.054, printed on 07/03/2022 at 09:08:47

New dwelling as designed

1 TER and DER				
-	•	nains) (fuel factor = 1.00)	TED 40.07	
Target Carbon Dioxid			TER = 16.07	
Dwelling Carbon Diox	(Ide Emission Ra	ate	DER = 9.65	OK
1b TFEE and DFEE				
Target Fabric Energy	Efficiency (TFE	E)	TFEE = 54.8	
Dwelling Fabric Energy			DFEE = 42.3	OK
2a Thermal bridging	Υ			
		ing calculated from linear th	nermal transmittances for each junction	
2b Fabric U-values				
	Element	Average	<u>Highest</u>	
	Wall	0.14 (max. 0.30)	0.14 (max. 0.70)	OK
	Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
	Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
	Openings	1.10 (max. 2.00)	1.10 (max. 3.30)	OK
3 Air permeability				
	Air permeabili	ty at 50 pascals:	4.00	OK
	Maximum :		10.00	
4 Heating efficiency				
Main heating system:	:			
	Boiler and unc	lerfloor heating, mains gas		
	Vaillant ecoFI	Toure 630		

	Boller and undernoor heating, mains gas
	Vaillant ecoFIT pure 630
Source of efficiency:	from boiler database
	Vaillant ecoFIT pure 630 VU 306/6-3 (H-GB)
	Efficiency: 89.9% SEDBUK2009
	Minimum: 88.0%
• · · ·	

Secondary heating system:

None-

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OK

Hot water storage Manufacture	er's declared cylinder loss factor (kWh/day) 2.14	
Permitted by		OK
Primary pipework insulated	Yes	OK
6 Controls		
	ervices Compliance Guide" by the DCLG)	
Space heating controls	Time and temperature zone control	OK
	Cylinderstat - Yes	OK
	Independent timer for DHW - Yes	OK
Boiler Interlock	Yes	OK
7 Low energy lights		
0, 0	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK
8 Mechanical ventilation		
	Notapplicable	
9 Summertime temperature		
Overheating risk (Thames Valley):		OK
	Not significant	OK
Based on:	3	
Thermal mass parameter :	231.33	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : South	. ,	
Ventilation rate :	8.00	
Blinds/curtains :		
None with blinds/shutters closed	0.00% of daylight hours	
10 Key features		
	ed, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K	
	value 0.11 W/m ² K	
Solid door U-	-value 1.10 W/m²K	
Walls U-valu	ie 0.14 W/m²K	

Photovoltaic array

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Project Information Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 1
		-	The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m²)	Av. Storey height (m)	Volume (m³)	
Ground floor (1)	49.29	2.50	123.22	(3a)
First floor	43.20	2.80	120.96	(3b)
Second floor	43.20	2.80	120.96	(3c)
	135.69			(4)
			365.14	(5)

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2. Ventilation rate

2. 70/1		uic									m³ per ho	our
							main + s	eondar	y + othe	er		
Numbo	er of chim	nove					heating $0 + 0 + 0$		x 40		0.00	(6a)
	rofoper						0 + 0 + 0 0 + 0 + 0		x 40 x 20		0.00	(6a) (6b)
		mittent fa	ans				5		x 10		50.00	(7a)
		ive vents					0		x 10		0.00	(7b)
	•	ess gas f					0		x 40		0.00	(7c)
											Air chang	ges per hour
											0.14	(8)
Pressu	re test, r	esult q50)						4.00			(17)
Air perr	neability										0.34	(18)
											2.00	(19)
											0.85	(20)
		•	•	ter factor							0.29	(21)
				nly wind s	-			γ				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
]][13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	vind spe	ed)				10110	(120)
0.37	0.36	0.35	0.32	0.31	0.27	0.27	0.26	0.29	0.31	0.32	0.34	
L		IL	π	JL_JL	J	JL	JLJL		JL_JL	R	3.76	(22b)
		ural vent inge rate		ntermitter	nt extrac	t fans						、 <i>,</i>
0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)
0.57	0.50	0.50	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.00	(20)

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	ross	s s paramete Openings m²	Netarea	U-value	A x U	kappa-value kJ/m²K		
Window - Double-g argon filled, low-E, soft coat (North) REAR			A, m² 6.720	W/m²K 1.05 (1.10)	W/K 7.08	KJ/112K	kJ/K	(27)
Window - Double-g argon filled, low-E, soft coat (East) SIDE			4.640	1.05 (1.10)	4.89			(27)
Window - Double-g argon filled, low-E, soft coat (South) FRONT			7.120	1.05 (1.10)	7.50			(27)
Solid door FRONT			2.270	1.10	2.50			(26)
Full glazed door -			7.510	1.10	8.26			(26)
Double-glazed, arg low-E, En=0.1, sof (North) REAR	-				0.20			()
Rooflight at 70° or Double-glazed, arg low-E, En=0.1, sof (n/a) ROOF	on filled,		2.170	1.05 (1.10)	2.29			(27)
Rooflight at 70° or Double-glazed, arg low-E, En=0.1, sof (n/a) ROOF	on filled,		1.320	1.05 (1.10)	1.39			(27)
Walls EXTERNAL#WII	NDOWS &	DOORS	125.64	0.14	17.59	70.00	8794.80	(29)
Ground floors UNDERGROUND		DOONG	49.29	0.13	6.41	110.00	5421.90	(28)
Flat roofs			3.92	0.11	0.43	9.00	35.28	(30)
GFREAR #ROOF		0	41.88	0.11	4.61	9.00	376.92	(30)
MAIN ROOF #RC	OFLIGHT	5	80.15	0.00	0.00	180.00	14427.00	
SOLID Internal floor FF			43.20	0.00	0.00	18.00	777.60	
Internal floor SF			43.20	0.00	0.00	18.00	777.60	
Internal ceiling FF			43.20	0.00	0.00	9.00	388.80	
Internal ceiling GF			43.20	0.00	0.00	9.00	388.80	

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SAP 2012 worksheet for New dwelling as c	designed - calculation of energy ratings
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	er heatin ed occup		y require	ements							kWh/yea 2.91
	average		usage ir	n litres pe	er day Vd	l,average	9				108.71
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres p	ber day f	or each r	nonth	Л			1	Л	
119.58	115.23	110.88	106.54	102.19	97.84	97.84	102.19	106.54	110.88	115.23	119.58
Energy	content o	of hot wat	ter used								
177.33	155.10	160.05	139.53	133.89	115.53	107.06	122.85	124.32	144.88	158.15	171.74
	content (tion loss	annual)									1710.43
26.60	23.26	24.01	20.93	20.08	17.33	16.06	18.43	18.65	21.73	23.72	25.76
	r volume						300.00				
	cturer's c		cylinder l	oss facto	or (kWh/o	day)	2.14 0.5400				
	ature Fac lost from		ar cylinde	r (k)/h/c	hav)		0.5400				1.16
	orage los		, cynnac		ay)						1.10
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Net stor	age loss	Л	1		,	Л	Л		J	Л	
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Primary	loss	Л		л	я			A			
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26
Total he	at requir	ed for wa	ter heati	ng calcul	ated for	each mo	nth				
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Output f	from wate	er heater	for each	month, I	<wh moi<="" td=""><td>nth</td><td></td><td></td><td></td><td></td><td></td></wh>	nth					
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Heat ga	ins from	water he	ating, kV	/h/month	 ו						2406.12
106.23	94.26	100.48	92.14	91.79	84.16	82.87	88.12	87.08	95.44	98.33	104.37
L			IL	J	J	JL	JL	J	JL	JL	

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5. Internal gains

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Metabolic gains, Watts 174.50 </th <th>•••••••</th> <th></th> <th>-</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	•••••••		-									
174.50 174.50	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains 68.70 61.02 49.63 37.57 28.08 23.71 25.62 33.30 44.70 56.75 66.24 70.61 Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 Pumps and fans gains 3.00 3.00 3.00 3.00 3.00 3.00 3.00 3.00	Metabol	ic gains,	Watts		~							
68.70 61.02 49.63 37.57 28.08 23.71 25.62 33.30 44.70 56.75 66.24 70.61 Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50
Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36	Lighting	gains										
454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36 55	68.70	61.02	49.63	37.57	28.08	23.71	25.62	33.30	44.70	56.75	66.24	70.61
Cooking gains 55.36 55	Appliand	ces gains	5									
55.36 55.36 <td< td=""><td>454.41</td><td>459.13</td><td>447.24</td><td>421.95</td><td>390.02</td><td>360.00</td><td>339.95</td><td>335.24</td><td>347.12</td><td>372.42</td><td>404.35</td><td>434.36</td></td<>	454.41	459.13	447.24	421.95	390.02	360.00	339.95	335.24	347.12	372.42	404.35	434.36
Pumps and fans gains 3.00	Cooking	gains										
3.00 3.00	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36
Losses e.g. evaporation (negative values) -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 Water heating gains 142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	Pumps a	and fans	gains									
-116.34 -116.34	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Water heating gains 142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	Lossese	e.g. evap	oration (r	negative	values)							
142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34
Total internal gains	Water he	eating ga	iins									
	142.79	140.27	135.06	127.97	123.37	116.89	111.38	118.44	120.94	128.28	136.57	140.29
782.43 776.95 748.46 704.02 657.99 617.13 593.48 603.50 629.29 673.98 723.68 761.79	Total inte	ernal gaiı	าร									
	782.43	776.95	748.46	704.02	657.99	617.13	593.48	603.50	629.29	673.98	723.68	761.79

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 6.720 10.63	0.63 x 0.80	0.77	24.9577	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (East) SIDE	0.9 x 4.640 19.64	0.63 x 0.80	0.77	31.8294	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (South) FRONT	0.9 x 7.120 46.75	0.63 x 0.80	0.77	116.2638	
Solid door FRONT	0.9 x 2.270 0.00	0.00 x 0.70	0.77	0.0000	
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 7.510 10.63	0.63 x 0.80	0.77	27.8917	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 2.170 26.00	0.63 x 0.80	1.00	25.5921	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 1.320 26.00	0.63 x 0.80	1.00	15.5676	
Total solar gains, January				242.10	(83-1)
Solar gains					(00)
242.10 439.16 668.69 936.81 1144.24 11 Total gains	76.68 1117.58 957.2	29 761.03 503.	97 294.94	203.94	(83)
1024.53 1216.11 1417.14 1640.83 1802.23 17	93.81 1711.06 1560	.79 1390.32 117	7.94 1018.62	965.73	(84)

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7 Mean internal temperature

Temper	n <i>interna</i> ature dui system r	ring heati	ing perio	ds in the l	living are	a, Th1 (°	C)				21.00 0.75	(8
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau				R	P			-R				
57.58	57.70	57.82	58.37	58.48	58.97	58.97	59.06	58.78	58.48	58.27	58.04	
alpha												
4.84	4.85	4.85	4.89	4.90	4.93	4.93	4.94	4.92	4.90	4.88	4.87	
Utilisatio	on factor	for gains	forliving	area								
0.99	0.98	0.95	0.87	0.71	0.52	0.38	0.43	0.68	0.92	0.98	0.99	(8
Mean in	ternal ter	nperatur	e in living	garea T1								
20.10	20.26	20.48	20.73	20.88	20.93	20.94	20.94	20.90	20.69	20.34	20.07	(8
Temper	ature du	ring heati	ing perio	ds in rest	of dwelli	ng Th2						
19.99	19.99	19.99	20.00	20.00	20.01	20.01	20.01	20.01	20.00	20.00	20.00	(8
Utilisatio	on factor	for gains	for rest	of dwellir	ng							
0.99	0.98	0.94	0.83	0.65	0.44	0.29	0.34	0.60	0.89	0.98	0.99	(8
Mean in	ternal ter	mperatur	re in the r	est of dw	elling T2	2						
18.80	19.02	19.34	19.68	19.86	19.92	19.93	19.93	19.90	19.64	19.16	18.76	(9
0	rea fracti ternal ter	•		,	welling)						0.29	(9
19.17	19.37	19.66	19.98	20.15	20.21	20.22	20.22	20.18	19.94	19.50	19.14	(9
Apply ad	djustmen	t to the m	nean inte	rnal tem	perature	, where a	appropria	ate				
19.17	19.37	19.66	19.98	20.15	20.21	20.22	20.22	20.18	19.94	19.50	19.14	(9

8. Space heating requirement

	••	9.09	•••••								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatic	on factor	for gains							λ		
0.99	0.97	0.94	0.83	0.66	0.46	0.31	0.36	0.62	0.89	0.98	0.99
Useful g	ains										
1012.04	1183.65	1325.45	1368.29	1185.74	819.51	533.69	561.22	861.51	1050.32	993.29	956.59
Monthly	average	external	temperat	ture							
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	s rate for	mean in	ternal tei	mperatui	е						
2251.9	2186.9	1985.21	1655.37	1260.60	829.55	534.88	563.58	902.48	1391.94	1854.88	2243.6
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth					
922.43	674.20	490.86	206.69	55.70	-	-	-	-	254.16	620.34	957.53
Total space heating requirement per year (kWh/year) (October to May)						4181.92					
Space h	eating re	quireme	nt per m²	(kWh/m	²/year)						30.82

8c. Space cooling requirement - not applicable

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9a. Energy requirements

	kWh/year
No secondary heating system selectedFraction of space heat from main system(s)1.0000Efficiency of main heating system90.90%	(202) (206)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov De	ec
Space heating requirement	
922.43 674.20 490.86 206.69 55.70 254.16 620.34 95	57.53 (98)
Appendix Q - monthly energy saved (main heating system 1)	
0.00 0.00 0.00 0.00 0.00 0.00 0	.00 (210)
Space heating fuel (main heating system 1)	
1014.77 741.69 540.00 227.39 61.28 279.61 682.45 10	053.38 (211)
Appendix Q - monthly energy saved (main heating system 2)	
0.00 0.00 0.00 0.00 0.00 0.00 0	.00 (212)
Space heating fuel (main heating system 2)	
0.00 0.00 0.00 0.00 0.00 0.00 0	.00 (213)
Appendix Q - monthly energy saved (secondary heating system)	
0.00 0.00 0.00 0.00 0.00 0.00 0	.00 (214)
Space heating fuel (secondary)	
0.00 0.00 0.00 0.00 0.00 0.00 0	.00 (215)
Water heating	
Water heating requirement	
236.42 208.47 219.13 196.71 192.97 172.71 166.14 181.94 181.50 203.97 215.33 23	30.83 (64)
Efficiency of water heater	80.20 (216)
88.49 88.12 87.30 85.35 82.37 80.20 80.20 80.20 80.20 85.80 87.88 88	8.60 (217)
Water heating fuel	
267.17 236.56 251.00 230.48 234.27 215.35 207.16 226.85 226.31 237.71 245.03 26	60.51 (219)
Annual totals k	kWh/year
	4600.57 (211)
Space heating fuel (secondary)	0.00 (215)
5	2838.41 (219)
Electricity for pumps, fans and electric keep-hot	20.00 (220-)
central heating pump boiler with a fan-assisted flue	30.00 (230c) 45.00 (230e)
Total electricity for the above, kWh/year	75.00 (231)
Electricity for lighting (100.00% fixed LEL)	485.33 (232)
Energy saving/generation technologies	()
Appendix Q -	
Energy saved or generated ():	0.000 (236a)
Energy used ():	0.000 (237a)
Total delivered energy for all uses	7999.32 (238)

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10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price	£/year	
		p/kWh		
Space heating - main system 1	4600.569	3.480	160.10	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2838.41	3.480	98.78	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	485.335	13.190	64.02	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			452.78	(255)

11a. SAP	rating
----------	--------

	0.42	(256)
	1.05	(257)
SAPvalue	85.32	
	85	(258)
SAP band	В	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	4600.57	0.216	993.72	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	2838.41	0.216	613.10	(264)
Space and water heating			1606.82	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	485.33	0.519	251.89	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1897.63	(272)
			kg/m²/year	
CO2 emissions per m ²			13.99	(273)
Elvalue			85.93	(273a)
El rating			86	(274)
El band			В	

Calculation of stars for heating and DHW

Main heating energy efficiency Main heating environmental impact Water heating energy efficiency Water heating environmental impact

 $(3.48 / 0.9090) \times (1 + (0.29 \times 0.25)) = 4.1059$, stars = 4 (0.2160 / 0.9090) x (1 + (0.29 x 0.25)) = 0.2549, stars = 4 3.48 / 0.8456 = 4.1154, stars = 4 0.2160 / 0.8456 = 0.2554, stars = 4

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Project Information

_ .

Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE		House 1 The Garages Ferrymore St Richard's Court
			HAM
			TW107NS

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.05.054, printed on 07/03/2022 at 09:08:48

New dwelling as designed

Target Carbon Dioxide Emission RateTER = 16.07Dwelling Carbon Dioxide Emission RateDER = 15.46 1b TFEE and DFEE Target Fabric Energy Efficiency (TFEE)TFEE = 54.8Dwelling Fabric Energy Efficiency (DFEE)DFEE = 42.3 2a Thermal bridging Thermal bridging calculated from linear thermal transmittances for 2b Fabric U-values $Element$ AverageHighestWall0.14 (max. 0.30)0.14 (max. 0.70)Floor0.13 (max. 0.25)0.13 (max. 0.70)Roof0.11 (max. 0.20)0.11 (max. 0.35)Openings1.10 (max. 2.00)1.10 (max. 3.30)			ains) (fuel factor = 1.00)		-
1b TFEE and DFEE Target Fabric Energy Efficiency (TFEE) TFEE = 54.8 Dwelling Fabric Energy Efficiency (DFEE) DFEE = 42.3 2a Thermal bridging Thermal bridging calculated from linear thermal transmittances for 2b Fabric U-values Element Average Highest Wall 0.14 (max. 0.30) 0.14 (max. 0.70) Floor 0.13 (max. 0.25) 0.13 (max. 0.70) Roof 0.11 (max. 0.20) 0.11 (max. 0.35)		TER = 16.07			
Target Fabric Energy Efficiency (TFEE)TFEE = 54.8Dwelling Fabric Energy Efficiency (DFEE)DFEE = 42.3 2a Thermal bridging Thermal bridging calculated from linear thermal transmittances for 2b Fabric U-values ElementAverageHighestWall0.14 (max. 0.30)0.14 (max. 0.70)Floor0.13 (max. 0.25)0.13 (max. 0.70)Roof0.11 (max. 0.20)0.11 (max. 0.35)	OK	DER = 15.46	ite	ide Emission Ra	Dwelling Carbon Dio>
Dwelling Fabric Energy Efficiency (DFEE) DFEE = 42.3 2a Thermal bridging Thermal bridging calculated from linear thermal transmittances for 2b Fabric U-values Element Average Highest Wall 0.14 (max. 0.30) 0.14 (max. 0.70) Floor 0.13 (max. 0.25) 0.13 (max. 0.70) Roof 0.11 (max. 0.20) 0.11 (max. 0.35)					1b TFEE and DFEE
2a Thermal bridging Thermal bridging calculated from linear thermal transmittances for 2b Fabric U-values Element Average Highest Wall 0.14 (max. 0.30) 0.14 (max. 0.70) Floor 0.13 (max. 0.25) 0.13 (max. 0.70) Roof 0.11 (max. 0.20) 0.11 (max. 0.35)		TFEE = 54.8	Ξ)	Efficiency (TFEE	Target Fabric Energy
Thermal bridging calculated from linear thermal transmittances for 2b Fabric U-values Element Average Highest Wall 0.14 (max. 0.30) 0.14 (max. 0.70) Floor 0.13 (max. 0.25) 0.13 (max. 0.70) Roof 0.11 (max. 0.20) 0.11 (max. 0.35)	OK	DFEE = 42.3	EE)	gy Efficiency (DF	Dwelling Fabric Energy
Element Average Highest Wall 0.14 (max. 0.30) 0.14 (max. 0.70) Floor 0.13 (max. 0.25) 0.13 (max. 0.70) Roof 0.11 (max. 0.20) 0.11 (max. 0.35)	1 junction	hermal transmittances for each junction	ng calculated from linear th		2a Thermal bridging
Wall0.14 (max. 0.30)0.14 (max. 0.70)Floor0.13 (max. 0.25)0.13 (max. 0.70)Roof0.11 (max. 0.20)0.11 (max. 0.35)					2b Fabric U-values
Floor0.13 (max. 0.25)0.13 (max. 0.70)Roof0.11 (max. 0.20)0.11 (max. 0.35)		<u>Highest</u>	<u>Average</u>	<u>Element</u>	
Roof 0.11 (max. 0.20) 0.11 (max. 0.35)	OK	0.14 (max. 0.70)		Wall	
	OK	0.13 (max. 0.70)	0.13 (max. 0.25)	Floor	
Openings 1.10 (max. 2.00) 1.10 (max. 3.30)	OK	0.11 (max. 0.35)	0.11 (max. 0.20)	Roof	
	OK	1.10 (max. 3.30)	1.10 (max. 2.00)	Openings	
3 Air permeability					3 Air permeability

, ,			
	Air permeability at 50 pascals:	4.00	OK
	Maximum :	10.00	

OK

4 Heating efficiency

Main heating system:	
	Boiler and underfloor heating, mains gas
	Vaillant ecoFIT pure 630
Source of efficiency:	from boiler database
-	Vaillant ecoFIT pure 630 VU 306/6-3 (H-GB)
	Efficiency: 89.9% SEDBUK2009
	Minimum: 88.0%
0	

Secondary heating system:

None -

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Hot water storage Manufacture	er's declared cylinder loss factor (kWh/day) 2.14	
Permitted by		OK
Primary pipework insulated	Yes	OK
6 Controls	mises Compliance Quide" but he DCL ()	
	ervices Compliance Guide" by the DCLG)	OK
Space heating controls	Time and temperature zone control Cylinderstat - Yes	OK OK
	Independent timer for DHW - Yes	OK
Boiler Interlock	Yes	OK
Doller Interlock	165	OR
7 Low energy lights		
r Low energy lights	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK
8 Mechanical ventilation		
	Notapplicable	
9 Summertime temperature		
Overheating risk (Thames Valley):		OK
	Not significant	OK
Based on:		
Thermal mass parameter :	231.33	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : South	C (, , ,	
Ventilation rate :	8.00	
Blinds/curtains :		
None with blinds/shutters closed	0.00% of daylight hours	
10 Key features	ed, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K	
	value 0.11 W/m²K	

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Walls U-value 0.14 W/m²K

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Project Information Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 1
			The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m²)	Av. Storey height (m)	Volume (m³)	
Ground floor (1)	49.29	2.50	123.22	(3a)
First floor	43.20	2.80	120.96	(3b)
Second floor	43.20	2.80	120.96	(3c)
	135.69			(4)
			365.14	(5)

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2. Ventilation rate

2. 70/1		uic									m³ per ho	our
							main + s	eondar	y + othe	er		
Numbo	er of chim	nove					heating $0 + 0 + 0$		x 40		0.00	(6a)
	rofoper						0 + 0 + 0 0 + 0 + 0		x 40 x 20		0.00	(6a) (6b)
		mittent fa	ans				5		x 10		50.00	(00) (7a)
		ive vents					0		x 10		0.00	(7b)
	•	ess gas f					0		x 40		0.00	(7c)
											Air chang	ges per hour
											0.14	(8)
Pressu	re test, r	esult q50)						4.00			(17)
Air perr	neability										0.34	(18)
											2.00	(19)
											0.85	(20)
		•	•	ter factor							0.29	(21)
				nly wind s	-			γ				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
]][13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	vind spe	ed)				10110	(120)
0.37	0.36	0.35	0.32	0.31	0.27	0.27	0.26	0.29	0.31	0.32	0.34	
L		IL	π	JL_JL	J	JL			JL_JL	R	3.76	(22b)
		ural vent inge rate		ntermitter	nt extrac	t fans						、 <i>,</i>
0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)
0.57	0.50	0.50	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.00	(20)

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3. Heat losses Element	Gross	Openings	Netarea	U-value	AxU	kappa-value		
Window - Double argon filled, low- soft coat (South) FRONT	E, En=0.1,	m²	A, m² 7.120	W/m²K 1.05 (1.10)	W/K 7.50	kJ/m²K	kJ/K	(27)
Window - Double argon filled, low- soft coat (East) SIDE	-		4.640	1.05 (1.10)	4.89			(27)
Window - Double argon filled, low- soft coat (North) REAR	E, En=0.1,		6.720	1.05 (1.10)	7.08			(27)
Solid door FRONT			2.270	1.10	2.50			(26)
Full glazed door Double-glazed, a low-E, En=0.1, s (North) REAR	argon filled,		7.510	1.10	8.26			(26)
Rooflight at 70° Double-glazed, a low-E, En=0.1, s (n/a) ROOF	argon filled,		2.170	1.05 (1.10)	2.29			(27)
Rooflight at 70° Double-glazed, a low-E, En=0.1, s (n/a) ROOF	argon filled,		1.320	1.05 (1.10)	1.39			(27)
Walls EXTERNAL#V	MINDOWS 8	DOORS	125.64	0.14	17.59	70.00	8794.80	(29)
Ground floors			49.29	0.13	6.41	110.00	5421.90	(28)
UNDERGROU Flat roofs			3.92	0.11	0.43	9.00	35.28	(30)
GFREAR #RC Flat roofs			41.88	0.11	4.61	9.00	376.92	(30)
MAIN ROOF #I Party wall SOLID	ROOFLIGHT	5	80.15	0.00	0.00	180.00	14427.00	
Internal floor FF			43.20	0.00	0.00	18.00	777.60	
Internal floor SF			43.20	0.00	0.00	18.00	777.60	
Internal ceiling FF			43.20	0.00	0.00	9.00	388.80	
Internal ceiling GF			43.20	0.00	0.00	9.00	388.80	

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SAP 2012 worksheet for New dwelling as c	designed - calculation of energy ratings
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	er heatin ed occup		y require	ements							kWh/yea 2.91
	average		r usage ir	n litres pe	er day Vd	l,average	;				108.71
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres	ber day f	or each r	nonth	J <u> </u>		A			
119.58	115.23	110.88	106.54	102.19	97.84	97.84	102.19	106.54	110.88	115.23	119.58
Energy	content o	of hot wat	ter used								
177.33	155.10	160.05	139.53	133.89	115.53	107.06	122.85	124.32	144.88	158.15	171.74
	content (a tion loss	annual)									1710.43
26.60	23.26	24.01	20.93	20.08	17.33	16.06	18.43	18.65	21.73	23.72	25.76
	r volume,			_			150.00				
	cturer's d		cylinder l	oss facto	or (kWh/o	day)	1.60				
	ature Fac lost from		ar cylinde	r (k) / h / c	(vet		0.5400				0.86
	orage los		i cynnue		lay)						0.00
26.78	24.19	26.78	25.92	26.78	25.92	26.78	26.78	25.92	26.78	25.92	26.78
Net stor	age loss	Л	J			JL	л	,	л	,	
26.78	24.19	26.78	25.92	26.78	25.92	26.78	26.78	25.92	26.78	25.92	26.78
Primary	loss			A	.				n		
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26
Total he	eat requir	ed for wa	ter heati	ng calcul	lated for	each mo	nth				
227.38	200.30	210.09	187.97	183.93	163.96	157.10	172.90	172.75	194.93	206.58	221.79
Output f	from wate	er heater	for each	month, l	kWh/mor	nth					
		010.00	407.07	183.93	163.96	157.10	172.90	172.75	194.93	206.58	221.79
227.38	200.30	210.09	187.97	103.93	100.00		172.00			200.00	221.75
		J	J	J		101110	172.00			200.00	2299.68
	200.30	J	J	J		75.63	80.89	80.08	88.21	91.33	

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5. Internal gains

••••••••	iai gaint	•									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains, Watts											
174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50
Lighting	gains										
68.70	61.02	49.63	37.57	28.08	23.71	25.62	33.30	44.70	56.75	66.24	70.61
Appliand	ces gains	5									
454.41	459.13	447.24	421.95	390.02	360.00	339.95	335.24	347.12	372.42	404.35	434.36
Cooking	gains										
55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36
Pumps a	and fans	gains									
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lossese	e.g. evap	oration (r	negative	values)							
-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34
Water he	eating ga	lins									
133.07	130.55	125.34	118.25	113.65	107.17	101.66	108.72	111.22	118.56	126.85	130.57
Total inte	ernal gaiı	ns									
769.71	764.23	735.74	691.30	645.27	604.41	580.76	590.78	616.57	661.26	710.96	749.07

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (South) FRONT	0.9 x 7.120 46.75	0.63 x 0.80	0.77	116.2638	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (East) SIDE	0.9 x 4.640 19.64	0.63 x 0.80	0.77	31.8294	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 6.720 10.63	0.63 x 0.80	0.77	24.9577	
Solid door FRONT	0.9 x 2.270 0.00	0.00 x 0.70	0.77	0.0000	
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 7.510 10.63	0.63 x 0.80	0.77	27.8917	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 2.170 26.00	0.63 x 0.80	1.00	25.5921	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 1.320 26.00	0.63 x 0.80	1.00	15.5676	
Total solar gains, January				242.10	(83-1)
Solar gains					(22)
242.10 439.16 668.69 936.81 1144.24 11 Total gains	76.68 1117.58 957.2	29 761.03 503	.97 294.94	203.94	(83)
1011.81 1203.39 1404.42 1628.11 1789.51 17	81.09 1698.34 1548	.07 1377.60 116	5.22 1005.90	953.01	(84)

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7. Mean internal temperature

Temper	rature du system	•	ing perio	ds in the	living are	ea, Th1 ('	°C)				21.00 0.75
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau								~			
57.58	57.70	57.82	58.37	58.48	58.97	58.97	59.06	58.78	58.48	58.27	58.04
alpha											
4.84	4.85	4.85	4.89	4.90	4.93	4.93	4.94	4.92	4.90	4.88	4.87
Utilisati	on factor	for gains	s for living	garea							
0.99	0.98	0.95	0.87	0.71	0.52	0.38	0.43	0.69	0.92	0.98	0.99
Tweekd	lay										
19.97	20.14	20.40	20.69	20.86	20.92	20.93	20.93	20.89	20.64	20.24	19.94
Tweeke	nd										
20.42	20.51	20.66	20.82	20.92	20.96	20.96	20.96	20.94	20.79	20.57	20.40
24 inste	ad of 16										
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24 inste	ad of 9			.A	-A.						
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 inste	ad of 9			.A	-9L					<u> </u>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean in	iternal te	mperatu	re in living	garea T1				~		- A	
20.10	20.25	20.48	20.72	20.88	20.93	20.94	20.94	20.90	20.68	20.33	20.07
Temper	rature du	ring heat	ing perio	ds in rest	of dwelli	ing Th2				<u> </u>	
19.99	19.99	19.99	20.00	20.00	20.01	20.01	20.01	20.01	20.00	20.00	20.00
Utilisati	on factor	for gains	s for rest	of dwelli	ng						
0.99	0.98	0.94	0.84	0.65	0.44	0.30	0.34	0.61	0.90	0.98	0.99
Tweekd	lay							~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
18.79	19.01	19.33	19.68	19.86	19.92	19.93	19.93	19.90	19.63	19.15	18.75
Tweeke	nd										
18.79	19.01	19.33	19.68	19.86	19.92	19.93	19.93	19.90	19.63	19.15	18.75
Mean in	nternal te	mperatu	re in the i	rest of dv	velling T2	2	_/			1	R
18.79	19.01	19.33	19.68	19.86	19.92	19.93	19.93	19.90	19.63	19.15	18.75
•	rea fracti	•		,	л	л	_µ				0.29
Mean in	iternal tei	mperatu	re (for the	whole d	welling)						
19.16	19.36	19.66	19.98	20.15	20.21	20.22	20.22	20.18	19.93	19.48	19.13
Apply a	djustmer	nt to the r	nean inte	ernal tem	perature	, where a	appropria	ate			
19.16	19.36	19.66	19.98	20.15	20.21	20.22	20.22	20.18	19.93	19.48	19.13

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8. Space heating requirement

•											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatio	n factor f	for gains									
0.99	0.97	0.94	0.84	0.66	0.46	0.31	0.36	0.62	0.89	0.98	0.99
Useful ga	ains										
1000.06	1172.46	1316.08	1362.56	1183.78	819.17	533.64	561.12	860.03	1042.72	982.00	944.46
Monthly	average	external	temperat	ture							
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	s rate for	mean in	ternal ter	mperatur	e						
2250.6	2185.6	1984.19	1654.63	1260.41	829.52	534.87	563.57	902.33	1391.12	1853.34	2242.3
Fraction	of month	for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth					
930.40	680.86	497.08	210.29	57.01	-	-	-	-	259.21	627.37	965.61
Total spa	ace heati	ng requi	rement p	er year (kWh/yea	ar) (Octo	ber to Ma	ay)			4227.82
Space h	eating re	quireme	nt per m²	(kWh/m	²/year)						31.16

8c. Space cooling requirement - not applicable

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9a. Energy requirements

		uiremen									kWh/year	
Fraction	of space	eating sy e heat fro in heating	om main	system(5)			4	1.0000 21.68%			(202) (206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Spaceh	eatingre	quireme	nt	.,	л		Л		JL	Ju		
930.40	680.86	497.08	210.29	57.01	-	-	-	-	259.21	627.37	965.61	(98)
Append	ix Q - mo	onthly en	ergy sav	ed (main	heating	system ?	1)		JL	Ju		
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space h	eating fu	uel (main	heating	system ') I)	л		R	Л			
220.64	161.47	117.88	49.87	13.52	-	-	-	-	61.47	148.78	228.99	(211)
Append	ix Q - mo	onthly en	ergy sav	ed (main	heating	system 2	2)	-	J			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space h	neating fu	uel (main	heating	system 2	2)				7			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Append	ix Q - mo	onthly ene	ergy save	ed (seco	ndary he	ating sys	stem)		л			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space h	eating fu	iel (secor	ndary)	A	я		л <u> </u>		J			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterh					л			-				
	~	quiremer	1r							Dr.		
227.38		210.09	187.97	183.93	163.96	157.10	172.90	172.75	194.93	206.58	221.79	(64)
		er heater	1				2		¥		279.11	(216)
	279.11	279.11	279.11	279.11	279.11	279.11	279.11	279.11	279.11	279.11	279.11	(217)
Waterh	eating fu	el			. <u></u>		2					
81.47	71.76	75.27	67.34	65.90	58.75	56.29	61.95	61.89	69.84	74.01	79.46	(219)
Annual	totals										kWh/year	
Space h	neating fu	uel used,	main sy	stem 1							1002.62	(211)
Space h	eating fu	iel (secor	ndary)								0.00	(215)
	eating fu										823.93	(219)
	• •	mps, fan			ep-hot						0.00	(004)
		or the ab									0.00	(231)
		nting (100 eneration		,							485.33	(232)
		ated - µC		•							0.00	(235)
Append		atea pe	,	р «р							0.00	(_00)
Energ	y saved o	or genera	ated ():								0.000	(236a)
Energ	y used ()):									0.000	(237a)
Total de	livered e	nergy for	alluses								2311.89	(238)

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10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	1002.621	13.190	132.25	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
High-rate percentage	100.000%			(243)
Low-rate percentage	0.000%			(244)
High-rate cost	823.93	13.190	108.68	(245)
Low-rate	0.00	13.190	0.00	(246)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	0.000	13.190	0.00	(249)
Energy for lighting	485.335	13.190	64.02	(250)
Additional standing charges			0.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			304.94	(255)

11a. SAP rating

	0.72	(230)
	0.71	(257)
SAPvalue	90.11	
	90	(258)
SAP band	В	

0 42

(256)

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12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emission kg CO2/ye	-
Space heating, main system 1	1002.62	0.519	520.36	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	823.93	0.519	427.62	(264)
Space and water heating			947.98	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	485.33	0.519	251.89	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1199.87	(272)
			kg/m²/yea	ar
CO2 emissions per m ²			8.84	(273)
Elvalue			91.10	(273a)
El rating			91	(274)
El band			В	
Calculation of stars for heating and DHW				

Main heating energy efficiency Main heating environmental impact Water heating energy efficiency Water heating environmental impact

(13.19 / 4.2168) x (1 + (0.29 x 0.25)) = 3.3548, stars = 5 (0.5190 / 4.2168) x (1 + (0.29 x 0.25)) = 0.1320, stars = 5 13.19 / 2.7911 = 4.7257, stars = 4 0.52 / + (0.00 x 0.52) = 0.1859, stars = 5

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Project Information

Building type Semi-detached house

Reference Date Email:	1 March NONE	2022 Project	House 1 The Garages Ferrymore St Richard's Court HAM TW107NS
			100107103

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.05.054, printed on 07/03/2022 at 09:08:47

New dwelling as designed

2a Thermal bridging Thermal bridging calculated from	linear thermal transmittances for each junc	ction
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 42.3	OK
1b TFEE and DFEE Target Fabric Energy Efficiency (TFEE)	TFEE = 54.8	
Target Carbon Dioxide Emission Rate Dwelling Carbon Dioxide Emission Rate	TER = 23.71 DER = 9.62	OK
1 TER and DER Fuel for main heating system: Standard tariff (fuel factor	= 1.55)	

2b Fabric U-values				
	<u>Element</u>	<u>Average</u>	<u>Highest</u>	
	Wall	0.14 (max. 0.30)	0.14 (max. 0.70)	OK
	Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
	Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
	Openings	1.10 (max. 2.00)	1.10 (max. 3.30)	OK
3 Air permeability				
	Air permeabili	ty at 50 pascals:	4.00	OK
	Maximum :		10.00	

4 Heating efficiency

Main heating system:	
	Air source heat pump, underfloor, electric
	Daikin Altherma EPRA16DV3 + ETBH16D6V
Source of efficiency:	from boiler database
Secondary heating sy	stem:
	None -

5 Cylinder insulation

No cylinder Hot water storage

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	vices Compliance Guide" by the DCLG)	ОК
Space heating controls Hot water controls	2207 Time and temperature zone control	UK
Boiler Interlock	No cylinder No	OK
7 Low energy lights		
	Percentage of fixed lights with low-energy fittings: 100.0% Minimum: 75.0%	OK
8 Mechanical ventilation	Netersliechle	
	Notapplicable	
9 Summertime temperature		
Overheating risk (Thames Valley):		OK
	Not significant	OK
Based on:		
Thermal mass parameter :	231.33	
Overshading:	Average or unknown (20-60 % sky blocked)	
Orientation : South	0.00	
Ventilation rate :	8.00	
Blinds/curtains : None with blinds/shutters closed 0.0	00% of double bours	
10 Key features		
Double-glazed	d, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K	
	alue 0.11 W/m²K	
	alue 1.10 W/m²K	
Walls U-value	0.14 W/m²K	

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Project Information Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 2
			The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m²)	Av. Storey height (m)	Volume (m³)	
Ground floor (1)	49.29	2.50	123.22	(3a)
First floor	43.20	2.80	120.96	(3b)
Second floor	43.20	2.80	120.96	(3c)
	135.69			(4)
			365.14	(5)

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2. Ventilation rate

2. 70/1		uic									m³ per ho	our
							main + s	eondar	y + othe	er		
Numbo	er of chim	nove					heating $0 + 0 + 0$		x 40		0.00	(6a)
	rofoper						0 + 0 + 0 0 + 0 + 0		x 40 x 20		0.00	(6a) (6b)
		mittent fa	ans				5		x 10		50.00	(7a)
		ive vents					0		x 10		0.00	(7b)
	•	ess gas f					0		x 40		0.00	(7c)
											Air chang	ges per hour
											0.14	(8)
Pressu	re test, r	esult q50)						4.00			(17)
Air perr	neability										0.34	(18)
											2.00	(19)
											0.85	(20)
		•	•	ter factor							0.29	(21)
				nly wind s	-			γ				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
]][13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	vind spe	ed)				10110	(120)
0.37	0.36	0.35	0.32	0.31	0.27	0.27	0.26	0.29	0.31	0.32	0.34	
L		IL	π	JL_JL	J	JL	JLJL		JL_JL	R	3.76	(22b)
		ural vent inge rate		ntermitter	nt extrac	t fans						、 <i>,</i>
0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)
0.57	0.50	0.50	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.00	(20)

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<i>3. Heat losses</i> Element	Gross	Openings	Netarea	U-value	AxU	kappa-value		
Window - Doubl argon filled, low soft coat (North REAR	∕-E, En=0.1,	m²	A, m² 6.720	W/m²K 1.05 (1.10)	W/K 7.08	kJ/m²K	kJ/K	(27)
Window - Doubl argon filled, low soft coat (East) SIDE	∕-E, En=0.1,		3.480	1.05 (1.10)	3.67			(27)
Window - Doubl argon filled, low soft coat (South FRONT	∕-E, En=0.1,		7.120	1.05 (1.10)	7.50			(27)
Solid door FRONT			2.270	1.10	2.50			(26)
Full glazed doo	r -		7.510	1.10	8.26			(26)
Double-glazed, low-E, En=0.1, (North) REAR	argon filled,							. ,
Rooflight at 70° Double-glazed, low-E, En=0.1, (n/a) ROOF	argon filled,		2.170	1.05 (1.10)	2.29			(27)
Rooflight at 70° Double-glazed, low-E, En=0.1, (n/a) ROOF	argon filled,		1.320	1.05 (1.10)	1.39			(27)
Walls		DOODS	126.80	0.14	17.75	70.00	8876.00	(29)
EXTERNAL# Ground floors		DOORS	49.29	0.13	6.41	110.00	5421.90	(28)
UNDERGROL Flat roofs			3.92	0.11	0.43	9.00	35.28	(30)
GFREAR #RO Flat roofs			41.88	0.11	4.61	9.00	376.92	(30)
MAIN ROOF # Party wall	ROOFLIGH	S	80.15	0.00	0.00	180.00	14427.00	
SOLID Internal floor FF			43.20	0.00	0.00	18.00	777.60	
Internal floor SF			43.20	0.00	0.00	18.00	777.60	
Internal ceiling FF			43.20	0.00	0.00	9.00	388.80	
Internal ceiling GF			43.20	0.00	0.00	9.00	388.80	

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SAP 2012 worksheet for New dwelling as c	designed - calculation of energy ratings
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	er heatin ed occup		y require	ements							kWh/yea 2.91
	average		usage ir	n litres pe	er day Vd	l,average	9				108.71
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres p	ber day f	or each r	nonth	JI			1	Л	
119.58	115.23	110.88	106.54	102.19	97.84	97.84	102.19	106.54	110.88	115.23	119.58
Energy	content o	of hot wat	ter used								
177.33	155.10	160.05	139.53	133.89	115.53	107.06	122.85	124.32	144.88	158.15	171.74
	content (tion loss	annual)									1710.43
26.60	23.26	24.01	20.93	20.08	17.33	16.06	18.43	18.65	21.73	23.72	25.76
	r volume						300.00				
	cturer's c		cylinder l	oss facto	or (kWh/o	day)	2.14 0.5400				
	ature Fac lost from		ar cylinde	r (k)/h/c	hav)		0.5400				1.16
	orage los		, cynnac		ay)						1.10
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Net stor	age loss	Л	1		,	Л	Л		J	Л	
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Primary	loss	Л		л	я			A			
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26
Total he	at requir	ed for wa	ter heati	ng calcul	ated for	each mo	nth				
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Output f	from wate	er heater	for each	month, I	<wh moi<="" td=""><td>nth</td><td></td><td></td><td></td><td></td><td></td></wh>	nth					
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Heat ga	ins from	water he	ating, kV	/h/month	<u></u> ו						2406.12
106.23	94.26	100.48	92.14	91.79	84.16	82.87	88.12	87.08	95.44	98.33	104.37
L			IL	J	J	JL	JL	J	JL	JL	

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5. Internal gains

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Metabolic gains, Watts 174.50 </th <th>••••••••</th> <th>Jul guint</th> <th>•</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	••••••••	Jul guint	•									
174.50 174.50	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains 69.23 61.49 50.00 37.86 28.30 23.89 25.81 33.55 45.04 57.18 66.74 71.15 Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 55.36 Pumps and fans gains 3.00 3.00 3.00 3.00 3.00 3.00 3.00 3.00	Metabol	ic gains,	Watts		~							
69.23 61.49 50.00 37.86 28.30 23.89 25.81 33.55 45.04 57.18 66.74 71.15 Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50
Appliances gains 454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36	Lighting	gains										
454.41 459.13 447.24 421.95 390.02 360.00 339.95 335.24 347.12 372.42 404.35 434.36 Cooking gains 55.36 55	69.23	61.49	50.00	37.86	28.30	23.89	25.81	33.55	45.04	57.18	66.74	71.15
Cooking gains 55.36 55	Applianc	ces gains	5									
55.36 55.36 <td< td=""><td>454.41</td><td>459.13</td><td>447.24</td><td>421.95</td><td>390.02</td><td>360.00</td><td>339.95</td><td>335.24</td><td>347.12</td><td>372.42</td><td>404.35</td><td>434.36</td></td<>	454.41	459.13	447.24	421.95	390.02	360.00	339.95	335.24	347.12	372.42	404.35	434.36
Pumps and fans gains 3.00	Cooking	gains										
3.00 3.00	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36
Losses e.g. evaporation (negative values) -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 -116.34 Water heating gains 142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	Pumps a	and fans	gains									
-116.34 -116.34	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Water heating gains 142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	Lossese	e.g. evap	oration (r	negative	values)							
142.79 140.27 135.06 127.97 123.37 116.89 111.38 118.44 120.94 128.28 136.57 140.29 Total internal gains	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34
Total internal gains	Water he	eating ga	ins									
	142.79	140.27	135.06	127.97	123.37	116.89	111.38	118.44	120.94	128.28	136.57	140.29
700 05 777 44 740 04 704 00 050 04 047 04 500 07 000 70 000 00 074 44 704 40 700 00	Total inte	ernal gaiı	ns									
/82.95 / / /.41 /48.84 /04.30 658.21 61/.31 593.67 603.76 629.63 674.41 /24.19 /62.32	782.95	777.41	748.84	704.30	658.21	617.31	593.67	603.76	629.63	674.41	724.19	762.32

6. Solar gains (calculation for January)

Area & Flux	g & FF	Shading	Gains	
0.9 x 6.720 10.63	0.63 x 0.80	0.77	24.9577	
0.9 x 3.480 19.64	0.63 x 0.80	0.77	23.8721	
0.9 x 7.120 46.75	0.63 x 0.80	0.77	116.2638	
0.9 x 2.270 0.00	0.00 x 0.70	0.77	0.0000	
0.9 x 7.510 10.63	0.63 x 0.80	0.77	27.8917	
0.9 x 2.170 26.00	0.63 x 0.80	1.00	25.5921	
0.9 x 1.320 26.00	0.63 x 0.80	1.00	15.5676	
			234.15	(83-1)
00 70 4070 00 040 0		40 005 00	407.40	(02)
29.10 1072.92 918.9	03 / 31.21 485	.49 285.02	197.40	(83)
47.09 1666.60 1522	.69 1360.84 115	9.91 1009.20	959.72	(84)
	0.9 x 6.720 10.63 0.9 x 3.480 19.64 0.9 x 7.120 46.75 0.9 x 2.270 0.00 0.9 x 7.510 10.63 0.9 x 2.170 26.00 0.9 x 1.320 26.00 29.78 1072.92 918.9	0.9 × 6.720 10.63 0.63 × 0.80 0.9 × 3.480 19.64 0.63 × 0.80 0.9 × 7.120 46.75 0.63 × 0.80 0.9 × 2.270 0.00 0.00 × 0.70 0.9 × 7.510 10.63 0.63 × 0.80 0.9 × 2.170 26.00 0.63 × 0.80 0.9 × 1.320 26.00 0.63 × 0.80 29.78 1072.92 918.93 731.21 485	0.9 x 6.720 10.63 0.63 x 0.80 0.77 0.9 x 3.480 19.64 0.63 x 0.80 0.77 0.9 x 7.120 46.75 0.63 x 0.80 0.77 0.9 x 2.270 0.00 0.00 x 0.70 0.77 0.9 x 7.510 10.63 0.63 x 0.80 0.77 0.9 x 2.170 26.00 0.63 x 0.80 1.00 0.9 x 1.320 26.00 0.63 x 0.80 1.00 29.78 1072.92 918.93 731.21 485.49 285.02	0.9 x 6.720 10.63 0.63 x 0.80 0.77 24.9577 0.9 x 3.480 19.64 0.63 x 0.80 0.77 23.8721 0.9 x 7.120 46.75 0.63 x 0.80 0.77 116.2638 0.9 x 2.270 0.00 0.00 x 0.70 0.77 0.0000 0.9 x 7.510 10.63 0.63 x 0.80 0.77 27.8917 0.9 x 2.170 26.00 0.63 x 0.80 1.00 25.5921 0.9 x 1.320 26.00 0.63 x 0.80 1.00 15.5676 234.15 234.15 234.15 234.15

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7. Mean internal temperature

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec tau 58.14 58.26 58.38 58.94 59.05 59.55 59.65 59.36 59.05 58.83 58.61 alpha 4.88 4.88 4.89 4.93 4.94 4.97 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.00 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling T2 18.81 19.03 19.48	7. Wean Internal temperatureTemperature during heating periods in the living area, Th1 (°C)Heating system responsiveness0.7												(85)
58.14 58.26 58.38 58.94 59.05 59.55 59.65 59.36 59.05 58.83 58.61 alpha 4.88 4.89 4.93 4.94 4.97 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 <	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha 4.88 4.88 4.89 4.93 4.94 4.97 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29	tau												
4.88 4.89 4.93 4.94 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.0	58.14	58.26	58.38	58.94	59.05	59.55	59.55	59.65	59.36	59.05	58.83	58.61	
Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.02 20.02 20.01 20.00	alpha												
0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.01 20.00	4.88	4.88	4.89	4.93	4.94	4.97	4.97	4.98	4.96	4.94	4.92	4.91	
Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.01 20.00	Utilisatio	on factor	for gains	for living	area								
20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 19.93 19.94 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 20.22 20.22 20.22 20.19 19.94 19.50 19.15 (92)	0.99	0.98	0.96	0.87	0.72	0.53	0.39	0.44	0.69	0.93	0.98	0.99	(86)
Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72 / 135.69) 0.29 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 99.029 19.15 (92)	Mean in	ternal ter	nperatur	e in living	garea T1								
19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 0.29 (91) 0.29 (91) Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.94 19.94 19.94 19.94 19.94 19.94 19.95 19.15 (92)	20.11	20.26	20.48	20.73	20.88	20.93	20.94	20.94	20.90	20.69	20.35	20.08	(87)
Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72 / 135.69) 0.29 0.29 0.91 0.29 (91) Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.94 19.94 19.95 19.15 (92)	Temper	ature du	ring heati	ing perio	ds in rest	of dwelli	ng Th2						
0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.29 (91) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 99.019 19.15 (92)	19.99	20.00	20.00	20.01	20.01	20.02	20.02	20.02	20.01	20.01	20.00	20.00	(88)
Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.97 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72 / 135.69) 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.22 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 0.29	Utilisatio	on factor	for gains	for rest	of dwellir	ng							
18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.22 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 0.29 0.21 0.22 0.22 0.22 0.23 (92)	0.99	0.98	0.94	0.84	0.66	0.45	0.30	0.35	0.61	0.90	0.98	0.99	(89)
Living area fraction (38.72/135.69) 0.29 (91) Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.15 19.15 19.15 19.15	Mean in	iternal te	mperatur	e in the r	est of dw	elling T2	2						
Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.15 19.15 19.15 19.15	18.81	19.03	19.34	19.68	19.87	19.93	19.94	19.94	19.90	19.64	19.17	18.78	(90)
19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate	•		•		,		,			<u>л</u>		0.29	(91)
Apply adjustment to the mean internal temperature, where appropriate	Mean internal temperature (for the whole dwelling)												
	19.18	19.38	19.67	19.98	20.16	20.22	20.22	20.22	20.19	19.94	19.50	19.15	(92)
19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (93)	Apply adjustment to the mean internal temperature, where appropriate												
	19.18	19.38	19.67	19.98	20.16	20.22	20.22	20.22	20.19	19.94	19.50	19.15	(93)

8. Space heating requirement

	••	9.09	•••••								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatic	on factor f	for gains									
0.99	0.97	0.94	0.84	0.67	0.47	0.32	0.37	0.63	0.90	0.98	0.99
Useful g	ains										
1005.11	1170.37	1306.34	1349.33	1173.99	813.78	530.55	557.82	854.47	1038.64	984.96	950.93
Monthly	average	external	temperat	ture							
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	s rate for	mean in	ternal ter	mperatur	е						
2238.0	2172.6	1971.42	1643.53	1252.03	824.31	531.79	560.27	896.65	1382.55	1843.07	2229.8
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth	-				
917.23	673.52	494.81	211.82	58.07	-	-	-	-	255.87	617.84	951.45
Total space heating requirement per year (kWh/year) (October to May)										4180.6	
Space h	eating re	quireme	nt per m²	(kWh/m	²/year)						30.8

8c. Space cooling requirement - not applicable

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9a. Energy requirements

9a. Energy r	equiremen	Its								kWh/year	
No secondary Fraction of sp Efficiency of r	ace heat fr	om main	system(s)				1.0000 0.90%			(202) (206)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating	grequireme][JI][][]	
917.23 673.	52 494.81	211.82	58.07	-	-	-	-	255.87	617.84	951.45	(98)
Appendix Q -	monthly en	ergy sav	ed (mair	heating	system '	1)	J	JI][][]	
0.00 0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heatin	g fuel (mair	heating	system	1)	JI	JL	J	JL	Л][]	
1009.06 740.	94 544.35	233.03	63.88	-	-	-	-	281.48	679.69	1046.70	(211)
Appendix Q -	monthly en	ergy sav	ed (mair	heating	system 2	2)	J	JL	JL		
0.00 0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heatin	g fuel (mair	heating	system	2)	JL	JL	J	JL	JL		
0.00 0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q -	monthly en	ergy sav	ed (seco	ndary he	ating sys	stem)	J	J(JL		
0.00 0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating	g fuel (seco	ndary)][JI	J	J(][J	
0.00 0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterheating	I	_][JL	JI	J	JI][][]	
Waterheating	requireme	nt									
236.42 208.	47 219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83	(64)
Efficiency of w	ater heate	r					л			80.20	(216)
88.48 88.1	2 87.32	85.41	82.44	80.20	80.20	80.20	80.20	85.82	87.87	88.59	(217)
Waterheating	fuel							л			
267.20 236.	57 250.94	230.31	234.06	215.35	207.16	226.85	226.31	237.66	245.05	260.55	(219)
Annual totals	Л		n	я	Л	л		Л		kWh/year	
Space heatin			stem 1							4599.13	(211)
Space heating		ndary)								0.00	(215)
Water heating Electricity for			octric kov	on hot						2838.02	(219)
central heati				ep-not						30.00	(230c)
boiler with a		d flue								45.00	(230e)
Total electrici	ty for the ab	ove, kW	h/year							75.00	(231)
Electricity for			,							489.03	(232)
Energy saving PVs 0.80 x										1520.096	
PVs 0.80 x PVs 0.80 x										1520.986 0.000	
PVs 0.80 x										0.000	
										1520.986	(233)
Appendix Q -										0.000	(000.)
Energy save Energy use	•	ated ():								0.000 0.000	(236a) (237a)
Lifergy use	u ().									0.000	(201a)
Total delivere	d energy fo	r all uses								6480.19	(238)

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10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	4599.126	3.480	160.05	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2838.02	3.480	98.76	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	489.027	13.190	64.50	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	1520.986	13.190	-200.62	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			252.59	(255)
11a. SAP rating			0.42	(256)

	0.59	(257)
SAPvalue	91.81	
	92	(258)
SAP band	Α	

12a. Carbon dioxide emissions

	Energy	Emission factor	Emission	s
	kWh/year	kg CO2/kWh	kg CO2/ye	ear
Space heating, main system 1	4599.13	0.216	993.41	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	2838.02	0.216	613.01	(264)
Space and water heating			1606.42	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	489.03	0.519	253.80	(268)
Electricity generated - PVs	-1520.99	0.519	-789.39	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1109.76	(272)
			kg/m²/yea	r
CO2 emissions per m ²			8.18	(273)
Elvalue			91.77	(273a)
El rating			92	(274)
El band			Α	

Calculation of stars for heating and DHW

Main heating energy efficiency	
Main heating environmental impact	
Water heating energy efficiency	
Water heating environmental impact	

(3.48 / 0.9090) x (1 + (0.29 x 0.25)) = 4.1059, stars = 4 (0.2160 / 0.9090) x (1 + (0.29 x 0.25)) = 0.2549, stars = 4 3.48 / 0.8457 = 4.1148, stars = 4 0.2160 / 0.8457 = 0.2554, stars = 4

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Project Information

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Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 2
			The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.05.054, printed on 07/03/2022 at 09:08:47

New dwelling as designed

Fuel for main heating Target Carbon Dioxid Dwelling Carbon Dio>	le Emission Rate		TER = 16.08 DER = 9.67	OK
1b TFEE and DFEE				
Target Fabric Energy	• •		TFEE = 54.6	
Dwelling Fabric Energy	gy Efficiency (DF	-EE)	DFEE = 42.3	OK
2a Thermal bridging		ing calculated from linear th	nermal transmittances for each junction	on
2b Fabric U-values				
	Element	<u>Average</u>	<u>Highest</u>	•
	Wall	0.14 (max. 0.30)	0.14 (max. 0.70)	OK
	Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
	Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
	Openings	1.10 (max. 2.00)	1.10 (max. 3.30)	OK
3 Air permeability				
		ty at 50 pascals:	4.00	OK
	Maximum :		10.00	
4 Heating efficiency Main heating system				
Main neating system		erfloor heating, mains gas		
	Vaillant ecoFI			
Source of efficiency:	from boiler dat			
	Vaillant ecoFI	Г pure 630 VU 306/6-3 (Н-0	SB)	

Secondary heating system:

None -

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Efficiency: 89.9% SEDBUK2009

Approval of JPA Designer by BRE applies only to the software, data is not subject to quality control procedures, users are themselves responsible for the accuracy of the data. The results of the calculation should not be accepted without first checking

Minimum: 88.0%

OK

Hot water storage		
Manufacture Permitted by	r's declared cylinder loss factor (kWh/day) 2.14 DBSCG 2.86	ОК
Primary pipework insulated	Yes	OK
6 Controls		
	ervices Compliance Guide" by the DCLG)	
Space heating controls	Time and temperature zone control	OK
	Cylinderstat - Yes	OK
	Independent timer for DHW - Yes	OK
Boiler Interlock	Yes	OK
7 Low energy lights		
67 6	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK
8 Mechanical ventilation		
	Notapplicable	
9 Summertime temperature		
Overheating risk (Thames Valley):		OK
••••••••••••••••••••••••••••••••••••••	Not significant	OK
Based on:		
Thermal mass parameter :	231.92	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : South		
Ventilation rate :	8.00	
Blinds/curtains :		
None with blinds/shutters closed	0.00% of daylight hours	
10 Key features		
	ed, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K	
	value 0.11 W/m²K	
Solid door U	-value 1.10 W/m²K	
Walls U-valu	ie 0.14 W/m²K	

Photovoltaic array

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Project Information Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 2
			The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m²)	Av. Storey height (m)	Volume (m³)	
Ground floor (1)	49.29	2.50	123.22	(3a)
First floor	43.20	2.80	120.96	(3b)
Second floor	43.20	2.80	120.96	(3c)
	135.69			(4)
			365.14	(5)

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2. Ventilation rate

2. 70/1		uic									m³ per ho	our
							main + s	eondar	y + othe	er		
Numbo	er of chim	nove					heating $0 + 0 + 0$		x 40		0.00	(6a)
	rofoper						0 + 0 + 0 0 + 0 + 0		x 40 x 20		0.00	(6a) (6b)
		mittent fa	ans				5		x 10		50.00	(7a)
		ive vents					0		x 10		0.00	(7b)
	•	ess gas f					0		x 40		0.00	(7c)
											Air chang	ges per hour
											0.14	(8)
Pressu	re test, r	esult q50)						4.00			(17)
Air perr	neability										0.34	(18)
											2.00	(19)
											0.85	(20)
		•	•	ter factor							0.29	(21)
				nly wind s	-			γ				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
]][13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	vind spe	ed)				10110	(120)
0.37	0.36	0.35	0.32	0.31	0.27	0.27	0.26	0.29	0.31	0.32	0.34	
L		IL	π	JL_JL	J	JL	JLJL		JL_JL	R	3.76	(22b)
		ural vent inge rate		ntermitter	nt extrac	t fans						、 <i>,</i>
0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)
0.57	0.50	0.50	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.00	(20)

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<i>3. Heat losses and</i> Element Gro	DSS	Openings	Netarea	U-value	A x U	kappa-value		
Window - Double-gla argon filled, low-E, E soft coat (South) FRONT		m²	A, m² 7.120	W/m²K 1.05 (1.10)	W/K 7.50	kJ/m²K	kJ/K	(27)
Window - Double-gla argon filled, low-E, E soft coat (East) SIDE			3.480	1.05 (1.10)	3.67			(27)
Window - Double-gla argon filled, low-E, E soft coat (North) REAR			6.720	1.05 (1.10)	7.08			(27)
Solid door FRONT			2.270	1.10	2.50			(26)
Full glazed door - Double-glazed, argo low-E, En=0.1, soft (North) REAR			7.510	1.10	8.26			(26)
Rooflight at 70° or le Double-glazed, argo low-E, En=0.1, soft (n/a) ROOF	n filled,		2.170	1.05 (1.10)	2.29			(27)
Rooflight at 70° or le Double-glazed, argo low-E, En=0.1, soft (n/a) ROOF	n filled,		1.320	1.05 (1.10)	1.39			(27)
Walls EXTERNAL#WIN		DOORS	126.80	0.14	17.75	70.00	8876.00	(29)
Ground floors UNDERGROUND	00030	DOORS	49.29	0.13	6.41	110.00	5421.90	(28)
Flat roofs			3.92	0.11	0.43	9.00	35.28	(30)
GFREAR #ROOFL Flat roofs			41.88	0.11	4.61	9.00	376.92	(30)
MAIN ROOF #ROC Party wall SOLID	FLIGHT	3	80.15	0.00	0.00	180.00	14427.00	
Internal floor FF			43.20	0.00	0.00	18.00	777.60	
Internal floor SF			43.20	0.00	0.00	18.00	777.60	
Internal ceiling FF			43.20	0.00	0.00	9.00	388.80	
Internal ceiling GF			43.20	0.00	0.00	9.00	388.80	

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SAP 2012 worksheet for New dwelling as c	designed - calculation of energy ratings
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	er heatin ed occup		y require	ements							kWh/yea 2.91
	average		usage ir	n litres pe	er day Vd	l,average	9				108.71
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres p	ber day f	or each r	nonth	JI			1	Л	
119.58	115.23	110.88	106.54	102.19	97.84	97.84	102.19	106.54	110.88	115.23	119.58
Energy	content o	of hot wat	ter used								
177.33	155.10	160.05	139.53	133.89	115.53	107.06	122.85	124.32	144.88	158.15	171.74
	content (tion loss	annual)									1710.43
26.60	23.26	24.01	20.93	20.08	17.33	16.06	18.43	18.65	21.73	23.72	25.76
	r volume						300.00				
	cturer's c		cylinder l	oss facto	or (kWh/o	day)	2.14 0.5400				
	ature Fac lost from		ar cylinde	r (k)/h/c	hav)		0.5400				1.16
	orage los		, cynnac		ay)						1.10
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Net stor	age loss	Л	1		,	Л	Л		J	Л	
35.82	32.36	35.82	34.67	35.82	34.67	35.82	35.82	34.67	35.82	34.67	35.82
Primary	loss	Л		л	я			A			
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26
Total he	at requir	ed for wa	ter heati	ng calcul	ated for	each mo	nth				
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Output f	from wate	er heater	for each	month, l	<wh moi<="" td=""><td>nth</td><td></td><td></td><td></td><td></td><td></td></wh>	nth					
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83
Heat ga	ins from	water he	ating, kV	/h/month	<u></u> ו						2406.12
106.23	94.26	100.48	92.14	91.79	84.16	82.87	88.12	87.08	95.44	98.33	104.37
L			IL	J	J	JL	JL	J	JL	JL	

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5. Internal gains

		-									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts						~			
174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50
Lighting	gains					-	-				
69.23	61.49	50.00	37.86	28.30	23.89	25.81	33.55	45.04	57.18	66.74	71.15
Appliand	ces gains	5									
454.41	459.13	447.24	421.95	390.02	360.00	339.95	335.24	347.12	372.42	404.35	434.36
Cooking	gains										
55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36
Pumps a	and fans	gains									
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Lossese	e.g. evap	oration (r	negative	values)							
-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34
Water h	eating ga	lins									
142.79	140.27	135.06	127.97	123.37	116.89	111.38	118.44	120.94	128.28	136.57	140.29
Total inte	ernal gaiı	ns									
782.95	777.41	748.84	704.30	658.21	617.31	593.67	603.76	629.63	674.41	724.19	762.32

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (South) FRONT	0.9 x 7.120 46.75	0.63 x 0.80	0.77	116.2638	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (East) SIDE	0.9 x 3.480 19.64	0.63 x 0.80	0.77	23.8721	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 6.720 10.63	0.63 x 0.80	0.77	24.9577	
Solid door FRONT	0.9 x 2.270 0.00	0.00 x 0.70	0.77	0.0000	
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 7.510 10.63	0.63 x 0.80	0.77	27.8917	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 2.170 26.00	0.63 x 0.80	1.00	25.5921	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 1.320 26.00	0.63 x 0.80	1.00	15.5676	
Total solar gains, January				234.15	(83-1)
Solargains			10		
234.15 423.59 643.05 899.42 1098.42 11 Total gains	29.78 1072.92 918.9	03 731.21 485.	49 285.02	197.40	(83)
1017.10 1201.01 1391.88 1603.72 1756.63 17	47.09 1666.60 1522	.69 1360.84 1159	9.91 1009.20	959.72	(84)

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7. Mean internal temperature

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec tau 58.14 58.26 58.38 58.94 59.05 59.55 59.65 59.36 59.05 58.83 58.61 alpha 4.88 4.88 4.89 4.93 4.94 4.97 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.00 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling T2 18.81 19.03 19.48	Temper	<i>T. Mean Internal temperature</i> Temperature during heating periods in the living area, Th1 (°C) Heating system responsiveness								21.00 0.75	(85)		
58.14 58.26 58.38 58.94 59.05 59.55 59.65 59.36 59.05 58.83 58.61 alpha 4.88 4.89 4.93 4.94 4.97 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 <	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha 4.88 4.88 4.89 4.93 4.94 4.97 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29	tau												
4.88 4.89 4.93 4.94 4.97 4.98 4.96 4.94 4.92 4.91 Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.0	58.14	58.26	58.38	58.94	59.05	59.55	59.55	59.65	59.36	59.05	58.83	58.61	
Utilisation factor for gains for living area 0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.02 20.02 20.01 20.00	alpha												
0.99 0.98 0.96 0.87 0.72 0.53 0.39 0.44 0.69 0.93 0.98 0.99 (86) Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.01 20.00	4.88	4.88	4.89	4.93	4.94	4.97	4.97	4.98	4.96	4.94	4.92	4.91	
Mean internal temperature in living area T1 20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.01 20.00	Utilisatio	on factor	for gains	for living	area								
20.11 20.26 20.48 20.73 20.88 20.93 20.94 20.90 20.69 20.35 20.08 (87) Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 19.93 19.94 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 20.22 20.22 20.22 20.19 19.94 19.50 19.15 (92)	0.99	0.98	0.96	0.87	0.72	0.53	0.39	0.44	0.69	0.93	0.98	0.99	(86)
Temperature during heating periods in rest of dwelling Th2 19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72 / 135.69) 0.29 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 99.029 19.15 (92)	Mean in	ternal ter	nperatur	e in living	garea T1								
19.99 20.00 20.01 20.01 20.02 20.02 20.01 20.00 20.00 (88) Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 0.29 (91) 0.29 (91) Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.94 19.94 19.94 19.94 19.94 19.94 19.95 19.15 (92)	20.11	20.26	20.48	20.73	20.88	20.93	20.94	20.94	20.90	20.69	20.35	20.08	(87)
Utilisation factor for gains for rest of dwelling 0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72 / 135.69) 0.29 0.29 0.91 0.29 (91) Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.94 19.94 19.95 19.15 (92)	Temper	ature du	ring heati	ing perio	ds in rest	of dwelli	ng Th2						
0.99 0.98 0.94 0.84 0.66 0.45 0.30 0.35 0.61 0.90 0.98 0.99 (89) Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.29 (91) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 99.019 19.15 (92)	19.99	20.00	20.00	20.01	20.01	20.02	20.02	20.02	20.01	20.01	20.00	20.00	(88)
Mean internal temperature in the rest of dwelling T2 18.81 19.03 19.34 19.68 19.97 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72 / 135.69) 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.22 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 0.29	Utilisatio	on factor	for gains	for rest	of dwellir	ng							
18.81 19.03 19.34 19.68 19.87 19.93 19.94 19.90 19.64 19.17 18.78 (90) Living area fraction (38.72/135.69) 0.29 0.29 (91) Mean internal temperature (for the whole dwelling) 0.22 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 0.29 0.21 0.22 0.22 0.22 0.23 (92)	0.99	0.98	0.94	0.84	0.66	0.45	0.30	0.35	0.61	0.90	0.98	0.99	(89)
Living area fraction (38.72/135.69) 0.29 (91) Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.15 19.15 19.15 19.15	Mean in	iternal te	mperatur	e in the r	est of dw	elling T2	2						
Mean internal temperature (for the whole dwelling) 19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate 19.15 19.15 19.15 19.15	18.81	19.03	19.34	19.68	19.87	19.93	19.94	19.94	19.90	19.64	19.17	18.78	(90)
19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (92) Apply adjustment to the mean internal temperature, where appropriate	•		•		,		,			<u>л</u>		0.29	(91)
Apply adjustment to the mean internal temperature, where appropriate	Meanin	ternal ter	nperatur	e (for the	whole d	welling)							
	19.18	19.38	19.67	19.98	20.16	20.22	20.22	20.22	20.19	19.94	19.50	19.15	(92)
19.18 19.38 19.67 19.98 20.16 20.22 20.22 20.19 19.94 19.50 19.15 (93)	Apply a	djustmer	t to the m	nean inte	rnal tem	perature	, where a	ppropria	ate				
	19.18	19.38	19.67	19.98	20.16	20.22	20.22	20.22	20.19	19.94	19.50	19.15	(93)

8. Space heating requirement

	••	9.09	•••••								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatic	on factor f	for gains									
0.99	0.97	0.94	0.84	0.67	0.47	0.32	0.37	0.63	0.90	0.98	0.99
Useful g	ains										
1005.11	1170.37	1306.34	1349.33	1173.99	813.78	530.55	557.82	854.47	1038.64	984.96	950.93
Monthly	average	external	temperat	ture							
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	s rate for	mean in	ternal ter	mperatur	е						
2238.0	2172.6	1971.42	1643.53	1252.03	824.31	531.79	560.27	896.65	1382.55	1843.07	2229.8
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth	-				
917.23	673.52	494.81	211.82	58.07	-	-	-	-	255.87	617.84	951.45
	Total space heating requirement per year (kWh/year) (October to May)								4180.6		
Space h	eating re	quireme	nt per m²	(kWh/m	²/year)						30.8

8c. Space cooling requirement - not applicable

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9a. Energy requirements

		uirement		ootod							kWh/year	
Fraction	of space	eating sy e heat fro in heating	om main	system(s)			9	1.0000 0.90%			(202) (206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Spaceh	eating re	quireme	nt	<u>д</u>	л			R				
917.23	673.52	494.81	211.82	58.07	-	-	-	-	255.87	617.84	951.45	(98)
Append	ix Q - mo	onthly en	ergy save	ed (main	heating	system '	1)		X			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space h	neating fu	uel (main	heating	system 1	1)		н	R				
1009.06	740.94	544.35	233.03	63.88	-	-	-	-	281.48	679.69	1046.70	(211)
Append	ix Q - mo	onthly ene	ergy save	ed (main	heating	system 2	2)	A	л			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space h	neating fu	uel (main	heating	system 2	2)			A	л			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Append	ix Q - mo	onthly ene	ergy save	ed (seco	ndary he	ating sys	stem)	A	л			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space h	eating fu	el (secor	ndary)	л		Л	<u></u>		J <u> </u>	л		
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterh	eating		1	н		Л	<u></u>		J	л		
Waterh	eating re	quiremer	nt									
236.42	208.47	219.13	196.71	192.97	172.71	166.14	181.94	181.50	203.97	215.33	230.83	(64)
Efficiend	cy of wat	er heater									80.20	(216)
88.48	88.12	87.32	85.41	82.44	80.20	80.20	80.20	80.20	85.82	87.87	88.59	(217)
Water h	eating fu	el										
267.20	236.57	250.94	230.31	234.06	215.35	207.16	226.85	226.31	237.66	245.05	260.55	(219)
Annual	totals										kWh/year	
		uel used,	main sy	stem 1							4599.13	(211)
•	•	iel (secor	ndary)								0.00	(215)
	eating fu										2838.02	(219)
	• •	mps, fan:	s and ele	ectric kee	ep-hot						30.00	(230c)
	l heating with a far	pump n-assister	d fluo								45.00	(2300) (230e)
		or the ab		n/vear							75.00	(2300)
		nting (100									489.03	(232)
		eneration		,								()
Append												
		or genera	ated ():								0.000	(236a)
Energ	y used ()):									0.000	(237a)
Total de	livered e	nergy for	alluses								8001.17	(238)

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10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price	£/year	
		p/kWh		
Space heating - main system 1	4599.126	3.480	160.05	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2838.02	3.480	98.76	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	489.027	13.190	64.50	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			453.21	(255)

11a. SAP rating

	0.42	(256)
	1.05	(257)
SAPvalue	85.30	
	85	(258)
SAP band	В	

12a. Carbon dioxide emissions

	Energy	Emission factor	Emission	s
	kWh/year	kg CO2/kWh	kg CO2/ye	ear
Space heating, main system 1	4599.13	0.216	993.41	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	2838.02	0.216	613.01	(264)
Space and water heating			1606.42	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	489.03	0.519	253.80	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1899.15	(272)
			kg/m²/yea	r
CO2 emissions per m ²			14.00	(273)
Elvalue			85.92	(273a)
El rating			86	(274)
El band			В	

Calculation of stars for heating and DHW

Main heating energy efficiency Main heating environmental impact Water heating energy efficiency Water heating environmental impact

 $(3.48 / 0.9090) \times (1 + (0.29 \times 0.25)) = 4.1059$, stars = 4 $(0.2160 / 0.9090) \times (1 + (0.29 \times 0.25)) = 0.2549$, stars = 4 3.48 / 0.8457 = 4.1148, stars = 4 0.2160 / 0.8457 = 0.2554, stars = 4

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Project Information

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Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 2
			The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.05.054, printed on 07/03/2022 at 09:08:47

New dwelling as designed

1 TER and DER		cipe) (fuel feator 100)				
	•••	ains) (fuel factor = 1.00)				
	ioxide Emission Rate		TER = 16.08 DER = 15.49			
	Dioxide Emission Ra	le	DER = 13.49			
1b TFEE and DF	FEE					
Target Fabric En	ergy Efficiency (TFE	Ξ)	TFEE = 54.6			
-	Energy Efficiency (DF		DFEE = 42.3	Oł		
2a Thermal brid	lging					
	Thermal bridgi		nermal transmittances for each juncti	on		
	Thermal bridgi	Average	Highest	on Oł		
	Thermal bridgi ues <u>Element</u>	<u>Average</u> 0.14 (max. 0.30)	<u>Highest</u> 0.14 (max. 0.70)			
2a Thermal brid	Thermal bridgi ues <u>Element</u> Wall	<u>Average</u> 0.14 (max. 0.30) 0.13 (max. 0.25)	<u>Highest</u> 0.14 (max. 0.70) 0.13 (max. 0.70)	Oł		
	Thermal bridgi ues <u>Element</u> Wall Floor	<u>Average</u> 0.14 (max. 0.30)	<u>Highest</u> 0.14 (max. 0.70)	OF		
	Thermal bridgi ues <u>Element</u> Wall Floor Roof Openings	<u>Average</u> 0.14 (max. 0.30) 0.13 (max. 0.25) 0.11 (max. 0.20)	<u>Highest</u> 0.14 (max. 0.70) 0.13 (max. 0.70) 0.11 (max. 0.35)	OF OF		
2b Fabric U-valı	Thermal bridgi ues <u>Element</u> Wall Floor Roof Openings	<u>Average</u> 0.14 (max. 0.30) 0.13 (max. 0.25) 0.11 (max. 0.20)	<u>Highest</u> 0.14 (max. 0.70) 0.13 (max. 0.70) 0.11 (max. 0.35)	OF OF		

4 Heating efficiency

Main heating system:	
	Boiler and underfloor heating, mains gas
	Vaillant ecoFIT pure 630
Source of efficiency:	from boiler database
	Vaillant ecoFIT pure 630 VU 306/6-3 (H-GB)
	Efficiency: 89.9% SEDBUK2009
	Minimum: 88.0%
0	

Secondary heating system:

None -

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OK

5 Cylinder insulation Hot water storage		
Manufacture	er's declared cylinder loss factor (kWh/day) 2.14	
Permitted by	/ DBSCG 2.86	OK
Primary pipework insulated	Yes	OK
6 Controls		
(Also refer to "Domestic Building Se	ervices Compliance Guide" by the DCLG)	
Space heating controls	Time and temperature zone control	OK
	Cylinderstat - Yes	OK
	Independent timer for DHW - Yes	OK
Boiler Interlock	Yes	OK
7 Low energy lights		
	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK
8 Mechanical ventilation		
	Notapplicable	
9 Summertime temperature		
Overheating risk (Thames Valley):		OK
	Not significant	OK
Based on:	-	
Thermal mass parameter :	231.92	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : South		
Ventilation rate :	8.00	
Blinds/curtains :		
None with blinds/shutters closed	0.00% of daylight hours	
10 Key features		
	ed, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m²K	
	value 0.11 W/m ² K	
Solid door U	-value 1.10 W/m²K	

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Walls U-value 0.14 W/m²K

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Project Information Building type Semi-detached house

Reference			
Date	1 March	2022	
Email:	NONE	Project	House 2
			The Garages
			Ferrymore
			St Richard's Court
			HAM
			TW107NS

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m²)	Av. Storey height (m)	Volume (m³)	
Ground floor (1)	49.29	2.50	123.22	(3a)
First floor	43.20	2.80	120.96	(3b)
Second floor	43.20	2.80	120.96	(3c)
	135.69			(4)
			365.14	(5)

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2. Ventilation rate

2. 70/1		uic									m³ per ho	our
							main + s	eondar	y + othe	er		
Numbo	er of chim	nove					heating $0 + 0 + 0$		x 40		0.00	(6a)
	rofoper						0 + 0 + 0 0 + 0 + 0		x 40 x 20		0.00	(6a) (6b)
		mittent fa	ans				5		x 10		50.00	(00) (7a)
		ive vents					0		x 10		0.00	(7b)
	•	ess gas f					0		x 40		0.00	(7c)
											Air chang	ges per hour
											0.14	(8)
Pressu	re test, r	esult q50)						4.00			(17)
Air perr	neability										0.34	(18)
											2.00	(19)
											0.85	(20)
		•	•	ter factor							0.29	(21)
				nly wind s	-			γ				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
]][13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	vind spe	ed)				10110	(120)
0.37	0.36	0.35	0.32	0.31	0.27	0.27	0.26	0.29	0.31	0.32	0.34	
L		IL	π	JL_JL	J	JL	JLJL		JL_JL	R	3.76	(22b)
		ural vent inge rate		ntermitter	nt extrac	t fans						、 <i>,</i>
0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)
0.57	0.50	0.50	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.00	(20)

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3. Heat losses and I Element Gros	s Oper	nings Netarea		A x U	kappa-valu		
area Window - Double-glaz argon filled, low-E, En soft coat (North) REAR	ed,	A, m² 6.720	W/m²K 1.05 (1.10)	W/K 7.08	kJ/m²K	kJ/K	(27)
Window - Double-glaz argon filled, low-E, En soft coat (East) SIDE		3.480	1.05 (1.10)	3.67			(27)
Window - Double-glaz argon filled, low-E, En soft coat (South) FRONT		7.120		7.50			(27)
Solid door FRONT		2.270	1.10	2.50			(26)
Full glazed door -		7.510	1.10	8.26			(26)
Double-glazed, argon low-E, En=0.1, soft co (North) REAR			-				()
Rooflight at 70° or les Double-glazed, argon low-E, En=0.1, soft co (n/a) ROOF	filled,	2.170	1.05 (1.10)	2.29			(27)
Rooflight at 70° or les Double-glazed, argon low-E, En=0.1, soft co (n/a) ROOF	filled,	1.320	1.05 (1.10)	1.39			(27)
Walls EXTERNAL#WIND		126.80	0.14	17.75	70.00	8876.00	(29)
Ground floors	00030000	49.29	0.13	6.41	110.00	5421.90	(28)
UNDERGROUND Flat roofs		3.92	0.11	0.43	9.00	35.28	(30)
GFREAR #ROOFLI Flat roofs		41.88	0.11	4.61	9.00	376.92	(30)
MAIN ROOF #ROOF Party wall	LIGHTS	80.15	0.00	0.00	180.00	14427.00	
SOLID Internal floor FF		43.20	0.00	0.00	18.00	777.60	
Internal floor SF		43.20	0.00	0.00	18.00	777.60	
Internal ceiling FF		43.20	0.00	0.00	9.00	388.80	
Internal ceiling GF		43.20	0.00	0.00	9.00	388.80	

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SAP 2012 worksheet for New dwelling as c	designed - calculation of energy ratings
--	--

	er heatin ed occup		y require	ements							kWh/yea 2.91
	average		r usage ir	n litres pe	er day Vd	l,average	;				108.71
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres	ber day f	or each r	nonth	J <u> </u>		A			
119.58	115.23	110.88	106.54	102.19	97.84	97.84	102.19	106.54	110.88	115.23	119.58
Energy	content o	of hot wat	ter used								
177.33	155.10	160.05	139.53	133.89	115.53	107.06	122.85	124.32	144.88	158.15	171.74
	content (a tion loss	annual)									1710.43
26.60	23.26	24.01	20.93	20.08	17.33	16.06	18.43	18.65	21.73	23.72	25.76
	r volume,			_			150.00				
	cturer's d		cylinder l	oss facto	or (kWh/o	day)	1.60				
	ature Fac lost from		ar cylinde	r (k) / h / c	(vet		0.5400				0.86
	orage los		i cynnue		lay)						0.00
26.78	24.19	26.78	25.92	26.78	25.92	26.78	26.78	25.92	26.78	25.92	26.78
Net stor	age loss	Л	J			JL	л	,	J	Л	
26.78	24.19	26.78	25.92	26.78	25.92	26.78	26.78	25.92	26.78	25.92	26.78
Primary	loss			A	.				n		
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26
Total he	eat requir	ed for wa	ter heati	ng calcul	lated for	each mo	nth				
227.38	200.30	210.09	187.97	183.93	163.96	157.10	172.90	172.75	194.93	206.58	221.79
Output f	from wate	er heater	for each	month, l	kWh/mor	nth					
		010.00	407.07	183.93	163.96	157.10	172.90	172.75	194.93	206.58	221.79
227.38	200.30	210.09	187.97	103.93	100.00		172.00			200.00	221.75
		J	J	J		101110	112.00			200.00	2299.68
	200.30	J	J	J		75.63	80.89	80.08	88.21	91.33	

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5. Internal gains

•••••••		-									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts									
174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50	174.50
Lighting	gains			~							
69.23	61.49	50.00	37.86	28.30	23.89	25.81	33.55	45.04	57.18	66.74	71.15
Appliand	ces gains	5									
454.41	459.13	447.24	421.95	390.02	360.00	339.95	335.24	347.12	372.42	404.35	434.36
Cooking	gains										
55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36	55.36
Pumps a	and fans	gains									
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lossese	e.g. evap	oration (r	negative	values)							
-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34	-116.34
Water he	eating ga	lins									
133.07	130.55	125.34	118.25	113.65	107.17	101.66	108.72	111.22	118.56	126.85	130.57
Total inte	ernal gaiı	ns									
770.23	764.69	736.12	691.58	645.49	604.59	580.95	591.04	616.91	661.69	711.47	749.60

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 6.720 10.63	0.63 x 0.80	0.77	24.9577	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (East) SIDE	0.9 x 3.480 19.64	0.63 x 0.80	0.77	23.8721	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (South) FRONT	0.9 x 7.120 46.75	0.63 x 0.80	0.77	116.2638	
Solid door FRONT	0.9 x 2.270 0.00	0.00 x 0.70	0.77	0.0000	
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (North) REAR	0.9 x 7.510 10.63	0.63 x 0.80	0.77	27.8917	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 2.170 26.00	0.63 x 0.80	1.00	25.5921	
Rooflight at 70° or less - Double-glazed, argon filled, low-E, En=0.1, soft coat (n/a) ROOF	0.9 x 1.320 26.00	0.63 x 0.80	1.00	15.5676	
Total solar gains, January				234.15	(83-1)
Solar gains					(00)
234.15 423.59 643.05 899.42 1098.42 11 Total gains	29.78 1072.92 918.9	93 731.21 485.	49 285.02	197.40	(83)
1004.38 1188.29 1379.16 1591.00 1743.91 17	34.37 1653.88 1509	.97 1348.12 1147	7.19 996.48	947.00	(84)

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7. Mean internal temperature

•	ature dui system r	ring heat	0.	ds in the	living are	ea, Th1 ('	°C)				21.00 0.75
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau		л						~			
58.14	58.26	58.38	58.94	59.05	59.55	59.55	59.65	59.36	59.05	58.83	58.61
alpha											
4.88	4.88	4.89	4.93	4.94	4.97	4.97	4.98	4.96	4.94	4.92	4.91
Utilisatio	on factor	for gains	for living	garea							
0.99	0.98	0.96	0.88	0.72	0.53	0.39	0.44	0.70	0.93	0.99	0.99
Tweekd	ay										
19.98	20.15	20.40	20.68	20.86	20.92	20.94	20.93	20.89	20.64	20.25	19.94
Tweeke	nd										
20.42	20.52	20.66	20.82	20.92	20.96	20.96	20.96	20.94	20.79	20.57	20.40
24 inste	ad of 16										
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24 inste	ad of 9			- PL	-A.						
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 inste	ad of 9			- PL	-9L						
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean in	ternal ter	nperatu	re in living	garea T1				~			
20.11	20.25	20.47	20.72	20.88	20.93	20.94	20.94	20.90	20.68	20.34	20.08
Temper	ature du	ring heat	ing perio	ds in rest	of dwelli	ing Th2					
19.99	20.00	20.00	20.01	20.01	20.02	20.02	20.02	20.01	20.01	20.00	20.00
Utilisatio	on factor	for gains	s for rest	of dwellir	ng	1			_1		R
0.99	0.98	0.95	0.85	0.66	0.45	0.30	0.35	0.62	0.90	0.98	0.99
Tweekd	ay										
18.80	19.02	19.33	19.68	19.87	19.93	19.93	19.94	19.90	19.63	19.16	18.77
Tweeke	nd		_/		А	1	_/				R
18.80	19.02	19.33	19.68	19.87	19.93	19.93	19.94	19.90	19.63	19.16	18.77
Mean in	iternal te	mperatu	re in the i	est of dw	velling T2	2	_/			_/	R
18.80	19.02	19.33	19.68	19.87	19.93	19.93	19.94	19.90	19.63	19.16	18.77
•	rea fracti	•		,	л	л	_n			_n	0.29
Mean in	ternal ter	mperatu	re (for the	whole d	welling)						
19.18	19.37	19.66	19.98	20.16	20.22	20.22	20.22	20.19	19.93	19.49	19.14
Apply a	djustmen	it to the r	nean inte	ernal tem	perature	, where a	appropria	ate			
19.18	19.37	19.66	19.98	20.16	20.22	20.22	20.22	20.19	19.93	19.49	19.14

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8. Space heating requirement

		• •									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatic	on factor f	for gains					-				
0.99	0.98	0.94	0.84	0.67	0.47	0.32	0.37	0.63	0.90	0.98	0.99
Useful g	ains					-	-				
993.11	1159.12	1296.84	1343.40	1171.91	813.42	530.50	557.72	852.91	1030.91	973.63	938.78
Monthly	average	external	temperat	ture							
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	s rate for	mean in	ternal tei	mperatur	е						
2236.7	2171.4	1970.39	1642.77	1251.83	824.27	531.78	560.26	896.49	1381.72	1841.54	2228.5
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth					
925.22	680.22	501.12	215.54	59.46	-	-	-	-	261.00	624.90	959.55
Total spa	ace heati	ing requi	rement p	er year (kWh/yea	ar) (Octo	ber to Ma	ay)			4227.0
Space h	eating re	quireme	nt per m²	(kWh/m	²/year)						31.15

8c. Space cooling requirement - not applicable

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9a. Energy requirements

sa. Energy requirements	kWh/year	
No secondary heating system selectedFraction of space heat from main system(s)1.0000Efficiency of main heating system421.33%	•	(202) (206)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov	Dec	
Space heating requirement	<u>.</u>	
925.22 680.22 501.12 215.54 59.46 261.00 624.90	959.55 (9	98)
Appendix Q - monthly energy saved (main heating system 1)		
0.00 0.00 0.00 0.00 0.00 0.00	0.00 (2	210)
Space heating fuel (main heating system 1)		
219.60 161.45 118.94 51.16 14.11 61.95 148.32	227.74 (2	211)
Appendix Q - monthly energy saved (main heating system 2)		
0.00 0.00 0.00 0.00 0.00 0.00	0.00 (2	212)
Space heating fuel (main heating system 2)		
0.00 0.00 0.00 0.00 0.00 0.00	0.00 (2	213)
Appendix Q - monthly energy saved (secondary heating system)		
0.00 0.00 0.00 0.00 0.00 0.00	0.00 (2	214)
Space heating fuel (secondary)		
0.00 0.00 0.00 0.00 0.00 0.00	0.00 (2	215)
Water heating		
Water heating requirement		
227.38 200.30 210.09 187.97 183.93 163.96 157.10 172.90 172.75 194.93 206.58	221.79 (6	64)
Efficiency of water heater	279.11 (2	216)
279.11 279.11 279.11 279.11 279.11 279.11 279.11 279.11 279.11 279.11 279.11 279.11	279.11 (2	217)
Water heating fuel		
81.47 71.76 75.27 67.34 65.90 58.75 56.29 61.95 61.89 69.84 74.01	79.46 (2	219)
Annual totals	kWh/year	
Space heating fuel used, main system 1		211)
Space heating fuel (secondary)	0.00 (2	215)
Water heating fuel	823.93 (2	219)
Electricity for pumps, fans and electric keep-hot	0.00 (221)
Total electricity for the above, kWh/year Electricity for lighting (100.00% fixed LEL)		231) 232)
Energy saving/generation technologies	400.00 (2	202)
Electricity generated - µCHP/heat pump	0.00 (2	235)
Appendix Q -		
Energy saved or generated ():	•	236a)
Energy used ():	0.000 (2	237a)
Total delivered energy for all uses	2316.22 (2	238)

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10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	1003.261	13.190	132.33	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
High-rate percentage	100.000%			(243)
Low-rate percentage	0.000%			(244)
High-rate cost	823.93	13.190	108.68	(245)
Low-rate	0.00	13.190	0.00	(246)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	0.000	13.190	0.00	(249)
Energy for lighting	489.027	13.190	64.50	(250)
Additional standing charges			0.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			305.51	(255)

11a. SAP rating

	0.72	(200)
	0.71	(257)
SAPvalue	90.09	
	90	(258)
SAP band	В	

0 42

(256)

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12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emission kg CO2/ye	
Space heating, main system 1	1003.26	ັ0.519	520.69	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	823.93	0.519	427.62	(264)
Space and water heating			948.31	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	489.03	0.519	253.80	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1202.12	(272)
			kg/m²/yea	r
CO2 emissions per m ²			8.86	(273)
Elvalue			91.09	(273a)
El rating			91	(274)
El band			В	
Calculation of stars for heating and DHW				

Main heating energy efficiency Main heating environmental impact Water heating energy efficiency Water heating environmental impact

(13.19 / 4.2133) x (1 + (0.29 x 0.25)) = 3.3576, stars = 5 (0.5190 / 4.2133) x (1 + (0.29 x 0.25)) = 0.1321, stars = 5 13.19 / 2.7911 = 4.7257, stars = 4 0.52 / + (0.00 x 0.52) = 0.1859, stars = 5

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Project Information

Building type Semi-detached house

Reference Date Email:	1 March : NONE	 House 2 The Garages Ferrymore St Richard's Court HAM TW107NS
		10/10/105

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.05.054, printed on 07/03/2022 at 09:08:46

New dwelling as designed

2a Thermal bridging Thermal bridging calculated from lin	near thermal transmittances for each junc	ction
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 42.3	OK
1b TFEE and DFEE Target Fabric Energy Efficiency (TFEE)	TFEE = 54.6	
1 TER and DER Fuel for main heating system: Standard tariff (fuel factor = Target Carbon Dioxide Emission Rate Dwelling Carbon Dioxide Emission Rate	1.55) TER = 23.71 DER = 9.65	ОК

2b Fabric U-values				
	<u>Element</u>	<u>Average</u>	<u>Highest</u>	
	Wall	0.14 (max. 0.30)	0.14 (max. 0.70)	OK
	Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
	Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
	Openings	1.10 (max. 2.00)	1.10 (max. 3.30)	OK
3 Air permeability				
Air permeability at 50 pascals: Maximum :		4.00 10.00	OK	

4 Heating efficiency

Main heating system:	
	Air source heat pump, underfloor, electric
	Daikin Altherma EPRA16DV3 + ETBH16D6V
Source of efficiency:	from boiler database
Secondary heating sy	stem:
	None -

5 Cylinder insulation

No cylinder Hot water storage

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6 Controls (Also refer to "Domestic Building Serv Space heating controls	vices Compliance Guide" by the DCLG) 2207 Time and temperature zone control	ОК
Hot water controls	No cylinder	OK
Boiler Interlock	No	OK
7 Low energy lights		
	Percentage of fixed lights with low-energy fittings: 100.0% Minimum: 75.0%	ОК
8 Mechanical ventilation		
	Notapplicable	
9 Summertime temperature		
Overheating risk (Thames Valley):		OK
	Not significant	OK
Based on:		
Thermal mass parameter :	231.92	
Overshading :	Average or unknown (20-60 % sky blocked)	
Orientation : South		
Ventilation rate :	8.00	
Blinds/curtains :	000/ of doublet house	
None with blinds/shutters closed 0.	.00% of daylight hours	
10 Key features		
	d, argon filled, low-E, En=0.1, soft coat U-value 1.10 W/m ² K	
	alue 0.11 W/m²K /alue 1.10 W/m²K	
Walls U-value		
vvaiis O-value		

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