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Preliminary Assessment

4b Parkhill Road

Code for Sustainable Homes

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Executive Summary
4b Parkhill Road
Code for Sustainable Homes

Introduction:	Eight Associates have been appointed, as registered Code for Sustainable Homes assessors, to undertake a preliminary assessment of the likely score for the proposed development at 4b Parkhill Road in Belsize Park, London. This report is based on the outcome of a meeting held between the sustainability consultant and the architect held on the 19th of March 2015.
Code for Sustainable Homes:	The Code for Sustainable Homes is an environmental rating for homes. It forms part of the Building Research Establishment's (BRE) suite of environmental tools. This assessment has been undertaken under the Code for Sustainable Homes version November 2010, and the subsequent 2014 Code Addendum.
Planning Requirement:	The London Borough of Camden requires that the scheme meets a Code for Sustainable Homes Level 4, equivalent to a 68% score at the post-construction review. This document outlines how the development will meet this standard, and is intended to support the application to the local authority for planning consent.
Score Summary:	Based on the discussion with the architect and subsequent investigations, the development currently scores 71.11%, equivalent to a Level 4 rating under the scheme (minimum score required 68%). All mandatory requirements are met within the assessment including the Code Level 4 requirements.

Rating Summary
4b Parkhill Road
Code for Sustainable Homes

Minimum Score Required:

Code Level 1:	36%
Code Level 2:	48%
Code Level 3:	57%
Code Level 4:	68%
Code Level 5:	84%
Code Level 6:	90%

Credit allocation	Available	Awarded	% Achieved	Score
Energy	31	19	61%	22.30
Water	6	4	67%	6.00
Materials	24	19	79%	5.70
Surface Water Runoff	4	3	75%	1.65
Waste	8	5	63%	4.00
Pollution	4	4	100%	2.80
Health and Wellbeing	12	8	67%	9.33
Management	9	9	100%	10.00
Ecology	9	9	78%	9.33
			Total:	71.11%
			Rating:	Level 4

Mandatory Requirements:

The Code for Sustainable Homes also has certain mandatory requirements that must be met to allow the development to be certified. Compliance with these is detailed below. Further information on the mandatory credits can be found in Appendix 1.

Mandatory credits	Mandatory requirements achieved?
Carbon emissions (Ene1)	Yes
Indoor water use (Wat1)	Yes
Materials used (Mat1)	Yes
Surface water run off (Sur1)	Yes
Non-recycle waste storage (Was1)	Yes
Site waste management (Was2)	Yes

Energy
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Ene 1 – Dwelling Emission Rate:	Draft domestic energy (SAP) calculations have been carried out by Eight Associates based on fabric and services design parameters provided by the architect; these indicate that a 20.1% reduction in carbon emissions calculated in $kgCO_2/m^2/yr$, over Part L1A 2013 minimum requirements will be achievable, for which three credits are achievable.	3 of 10
Ene 2 – Fabric Energy Efficiency:	The above calculations demonstrate a dwelling fabric energy efficiency of $39.1kWh/m^2/year$; as the dwelling can be classed as 'mid terrace' under Code for Sustainable Homes methodology, six credits are achievable for this issue.	6 of 9
Ene 3 – Energy Display Devices:	Energy display devices will be provided for all dwellings to allow for real-time monitoring of heating and electricity usage.	2 of 2
Ene 4 – Drying Space:	A minimum of 6m+ of drying line will be installed to the utility room, which will be ventilated according to the requirements for intermittent extract ventilation, as defined in the Building Regulations Approved Document Part F.	1 of 1
Ene 5 – Eco-Labelled Goods:	White goods will be provided. The fridges and freezers will be A+ rated and washing machines and dishwashers will be A rated under the EU Energy Efficiency Labelling Scheme. Where provided, washer-dryers and / or tumble dryers will be B rated.	2 of 2
Ene 6 – External Lighting:	All space lighting within the external areas will be dedicated energy efficient, having a luminous efficacy greater than 40 lumens per circuit Watt. Space lighting will be controlled via a photocell, time switch and/or PIR movement detectors. All security lighting will have a maximum wattage of 150 W and will be controlled via PIR movement detectors.	2 of 2

Energy
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Ene 7 – LZC Energy Sources:	No renewables are proposed for the site due to space and heritage constraints.	0 of 2
Ene 8 – Cycle Storage:	The architect has confirmed that cycle storage facilities will be incorporated for the dwelling within the specification for the scheme, in line with requirements for full credits to be targeted.	2 of 2
Ene 9 – Home Office:	Home office facilities will be provided in a dedicated study to allow residents to work from home. This will include double power sockets and two telephone points along a wall of at least 1.8m in length in a room with adequate ventilation. 1.5% daylight is likely to be achieved in the assigned room.	1 of 1

Water
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Wat 1 – Internal Water Use:	Daily internal water use will meet the Code for Sustainable Homes Level 4 mandatory requirement of 105 litres per person, per day for three credits. This will be achieved through the specification of low-consumption fittings, such as the following: - Showers no more than 9 litres/minute; - Baths to hold no more than 140 litres to overflow; - Taps no more than 4 litres/minute; - Dual Flush (6/3 litre) WCs; - Low water use white goods.	3 of 5
Wat 2 – External Water Use:	The architect confirmed that a rainwater collection system will be provided for the purpose of external plant irrigation, in line with Code for Sustainable Homes criteria.	1 of 1

Materials
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Code for Sustainable Homes

Mat 1 – Environmental Impact of Materials:	The architect has confirmed that at least three of the five key elements of the building envelope will be A+ - D rated according the 2008 version of the Green Guide. The architect has confirmed that 10 credits should be targeted. The green guide will be used to ascertain the ratings for the following element build-ups: - Roof; - External Walls; - Internal walls (including separating walls); - Upper and ground floors (including separating floors); - Windows.	10 of 15
Mat 2 – Responsible Sourcing: Basic Building Elements:	The architect has confirmed that all-concrete will be sourced from a supplier with a BES 6001 certificate. All timber will be either PEFC or FSC certified; any masonry or steel will be sourced from a supplier with an ISO 14001 or UK CARES certificate.	6 of 6
Mat 3 – Responsible Sourcing: Finishing Building Elements:	Skirting, doors, windows, the staircase, fixed furniture, panelling and other finishing elements will be sourced from FSC or PEFC certified suppliers. Therefore, three credits are likely to be achieved.	3 of 3

Surface Water Runoff

4b Parkhill Road

Code for Sustainable Homes

Sur 1 – Reduction of Surface Water Run-off:	The architect has confirmed that the development will meet the minimum mandatory requirements under CSH for existing and proposed run-off rates. In addition, storm water attenuation will be provided to ensure there is no discharge into local watercourses for rainfall depths up to 5mm for one credit.	1 of 2
Sur 2 – Flood Risk:	The development is understood to be located in a zone defined as having a low annual probability of flooding. A site-specific flood risk assessment will be undertaken to confirm that there are no site-specific flood risks.	2 of 2

Waste
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Was 1 – Recycling Facilities:	The architect has confirmed that general and recyclable waste storage will be provided and will comply with the council requirements for recycling. The separation for recyclables will be provided in a fixed position in the kitchens, with 30 litres to be provided for waste and 30 litres for recyclables. A compliant local authority collection scheme for recyclable materials is in place, therefore four credits will be achievable for this issue.	4 of 4
Was 2 – Site Waste Management Plan:	The contractor will operate a Site Waste Management Plan (SWMP) in line with statutory guidance and BRE requirements to reduce waste throughout the construction phases for one credit. The SWMP will contain the following: - Target benchmarks for resource efficiency, i.e. m^3 of waste per $100m^2$, or tonnes of waste per $100m^2$, set in accordance with best practice. - Procedures and commitments to minimize non-hazardous construction waste at design stage. Specify waste minimisation actions relating to at least 3 waste groups and support then by appropriate monitoring of waste. - Procedures for minimising hazardous waste. - Monitoring, measuring and reporting of hazardous and non-hazardous site waste production according to the defined waste groups (according to the waste streams generated by the scope of works).	1 of 3
Was 3 – Composting:	The scheme will not have dedicated composting facilities due to site constraints.	0 of 1

Pollution
4b Parkhill Road
Code for Sustainable Homes

Pol 1 – Insulant GWP:	Any material used to produce a cellular structure in either a plastic or other foam insulation used in either manufacture or installation is deemed a blowing agent. The Intergovernmental Panel of Climate Change (IPPC) determines the Global Warming Potential (GWP) of a blowing agent by using a 100-year Integrated Time Horizon methodology. It has been confirmed that the dwelling will be insulated with materials that will have a GWP of less than 5 and an Ozone Depletion Potential (ODP) of zero. This will include all insulation specified within the building elements, hot water stores and piping.	1 of 1
Pol 2 – NO_x Emissions:	It has been confirmed that the dry NO_X (nitrogen oxide) emissions of space heating and hot water systems will be no more than 40mg/kWh.	3 of 3

Health and Wellbeing

4b Parkhill Road

Code for Sustainable Homes

Hea 1 – Daylighting:	The architect has confirmed that the kitchen will achieve an average daylight factor (ADF) of 2%, and that the living room, dining room and study will achieve an ADF of 1.5%. In addition, 80% of the working plane in the kitchen, living room, dining room and study will received direct light from the sky.	3 of 3
Hea 2 – Sound Insulation:	The architect has confirmed that one of the following will be implemented for four credits to be achievable: - A programme of pre-completion testing will be conducted to confirm performance levels 8dB better than the building regulations Part E Document benchmarks; - Use of constructions for all relevant building elements that have been assessed and approved as Robust Details by Robust Details Ltd. and found to achieve the performance standards stated above.	4 of 4
Hea 3 – Private Space:	The architect has confirmed sufficient private external space will be provided to meet the 1.5m^2 per bedroom requirement set out by the Code for Sustainable Homes for one credit.	1 of 1
Hea 4 – Lifetime Homes:	The architect has confirmed that credits for meeting the Lifetime Homes criteria will not be targeted at this stage.	0 of 4

Management
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Man 1- Home User Guide:	The architect has confirmed that a Home User Guide will be provided to the future occupier with information on how to operate their home efficiently and how to make the best use of local facilities. The guide will meet all Code for Sustainable Homes requirements.	3 of 3
Man 2 – Considerate Constructors Scheme:	The architect has confirmed that two credits will be targeted. The contractor will be required to register the site under the Considerate Constructors Scheme and to achieve a score of at least 35 out of 50, including at least 7 points within each section of the scheme.	2 of 2
Man 3 – Construction Site Impacts:	The architect has confirmed that two credits will be targeted. The contractor will implement the following on site practices: - Monitor, report and set targets for CO_2 production or energy use arising from site activities; - Monitor, report and set targets for water consumption from site activities; - Adopt best practice policies in respect of air (dust) pollution arising from site activities; - Adopt best practice policies in respect of water (ground and surface) pollution occurring on the site; - 80% of site timber is reclaimed, re-used or responsibly sourced.	2 of 2
Man 4 – Security:	The architect has confirmed that the local Architectural Liaison Officer (ALO) or a Crime Prevention Design Advisor (CPDA) will be consulted at design stage to incorporate the principles of 'Secured by Design (SBD)' within the development's design and layout for two credits.	2 of 2

Ecology
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Eco 1 – Ecological Value of Site:	The architect has confirmed that an ecologist will be appointed to carry out a survey, with a view to confirming that the pre-development site is of low ecological value for one credit.	1 of 1
Eco 2 – Ecological Enhancement:	The architect has confirmed that a suitably qualified ecologist will be appointed to recommend appropriate ecological features that will positively enhance the ecology of the site. The developer will commit to adopt all key recommendations and 30% of additional recommendations.	1 of 1
Eco 3 – Protection of Ecological Features:	The architect has confirmed that the existing site has no areas of ecological value therefore this credit can be awarded by default.	1 of 1
Eco 4 – Change in Ecological Value of Site:	The architect has confirmed that an ecologist will be appointed to confirm that the change in species richness of the site from pre-development to practical completion will be neutral.	2 of 4
Eco 5 – Building Footprint:	The architect has confirmed that full credits should be achievable; the dwelling includes a basement, ground, 1st and 2nd floor so the net internal floor area: net internal ground floor area ratio is therefore likely to be greater than or equal to 3:1.	2 of 2

Appendix 1
Information about the Code for Sustainable Homes

Background:

The Code for Sustainable Homes was launched in December 2006 with the publication of 'Code for Sustainable Homes: A step change in sustainable home building practice' (Department of Communities and Local Government 2006).

This introduced a single national standard to be used in design and construction of new homes in England, based on the BRE's EcoHomes scheme. Adoption of the Code is intended to encourage continuous improvements in sustainable home building.

Issues:

The Code for Sustainable Homes is a set of sustainable design principles covering performance in nine key areas listed below:

- Energy;
- Water;
- Materials;
- Surface water runoff;
- Waste;
- Pollution;
- Health and wellbeing;
- Management;
- Ecology.

In each of these categories performance targets are set, which are in excess of the minimum needed to satisfy Building Regulations, but are considered to be best practice, technically feasible and within the capability of the building industry to supply.

Mandatory Requirements:

The Code for Sustainable Homes includes several mandatory requirements. Four of these consist of a single mandatory requirement that must be met regardless of the Code level aimed for. These are as follows:

Credit reference / title	Mandatory Requirement
Mat1: Environmental Impact of Materials	At least three of the following five elements must achieve a rating of D or better in the 2008 Green Guide: *Roof, external walls, internal walls, upper & ground floors and windows.*
Sur1: Management of Surface Water Run-off	Ensure that the peak rate of run off is no greater for the developed site than it was for the pre-developed site.
Was1: Storage of Non-recyclable Waste	Provide sufficient space for waste storage to comply with BS5906 (2005); i.e. a volume of 100 litres for a single bedroom dwelling and another 70 litres for each additional bedroom.

Appendix 1 (continued)
Information about the Code for Sustainable Homes

So long as these are achieved, two further issues have mandatory requirements. The minimum standards for these vary for each level of the Code, with more stringent benchmarks the higher the Code level sought. These are as follows:

Code level	1	2	3	4	5	6
Ene1: CO_2 Emission rate % improvement in DER over TER				19	100	'True zero'
Wat1: Indoor water use Maximum litres/person/day	120	120	105	105	80	80

The final credits for which a mandatory requirement applies for Level 5 and 6 only are Ene 2, where a Fabric Energy Efficiency of maximum 39 (for apartment block and Mid-terrace) and 46 for end terrace, semi-detached and detached) must be achieved and Hea 4, Lifetime Homes, for which all of the credit requirements must be complied with.

Scoring System

The Code uses a rating system of one to six stars and it differs from EcoHomes in several key regards outlined below:

- It is assessed at the level of an individual 'dwelling'.
- It contains minimum mandatory standards for energy, water, materials, waste and surface water run-off, which must be met before even the lowest of the Code levels can be achieved.
- It demands higher minimum standards for energy and water to be met before the higher levels of the Code can be achieved.
- It is performed in two stages with 'Final' Code certification taking place after the Post Construction Review has been carried out.

In addition to the mandatory requirements, each design category scores a number of percentage points. The total number of percentage points establishes a 'star rating' for the dwelling.

Code Levels	Total Points Score (equal to or greater than)
Level 1 (★)	36 Points
Level 2 (★★)	48 Points
Level 3 (★★★)	57 Points
Level 4 (★★★★)	68 Points
Level 5 (★★★★★)	84 Points
Level 6 (★★★★★★)	90 Points

Appendix 2
Score Sheet

Code for Sustainable Homes 4b Parkhill Road Score Summary 25.03.2015			Score	Credits available	Score assessment Current Rating: Level 4 Sub-total	Credits available	% achieved	Weighting factor	Credits Score
Energy	Ene 1	Dwelling CO_2 emission rate*	3	10	19	31	61%	36.4	22.30
	Ene 2	Building fabric energy efficiency*	6	9					
	Ene 3	Energy display devices	2	2					
	Ene 4	Drying space	1	1					
	Ene 5	EcoLabelled goods	2	2					
	Ene 6	External lighting	2	2					
	Ene 7	Zero/Low Carbon Energy Source	0	2					
	Ene 8	Cycle Storage	2	2					
	Ene 9	Home office	1	1					
Water	Wat 1	Internal Water Use*	3	5	4	6	67%	9.0	6.00
	Wat 2	External Water Use	1	1					
Materials	Mat 1	Environmental Impact of Materials*	10	15	19	24	79%	7.2	5.70
	Mat 2	Responsible materials: Basic elements	6	6					
	Mat 3	Responsible materials: Finishes	3	3					
Surface Water Runnoff	SW 1	Reduction of Surface Runoff*	1	2	3	4	75%	2.2	1.65
	SW 2	Flood Risk	2	2					
Waste	Was 1	Recycling facilities*	4	4	5	8	63%	6.4	4.00
	Was 2	Site Waste Management Plan	1	3					
	Was 3	Composting	0	1					
Pollution	Pol 1	Insulant GWP	1	1	4	4	100%	2.8	2.80
	Pol 2	NO_x Emissions	3	3					
Health & Wellbeing	Hea 1	Daylighting	3	3	8	12	67%	14.0	9.33
	Hea 2	Sound Insulation	4	4					
	Hea 3	Private space	1	1					
	Hea 4	Lifetime Homes	0	4					
Management	Man 1	Home user guide	3	3	9	9	100%	10.0	10.00
	Man 2	Considerate Constructors Scheme	2	2					
	Man 3	Construction Site Impacts	2	2					
	Man 4	Security - ALO	2	2					
Land Use & Ecology	Eco 1	Ecological Value of Site	1	1	7	9	78%	12.0	9.33
	Eco 2	Ecological Enhancement	1	1					
	Eco 3	Protection of Ecological Features	1	1					
	Eco 4	Change of Ecological Value of Site	2	4					
	Eco 5	Buidling Footprint	2	2					
		**Mandetory elements apply*					Total Score:		**71.11**
							Rating:		**Level 4**

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Design Guide
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Code for Sustainable Homes

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Executive Summary

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Introduction

Eight Associates have been appointed, as registered Code for Sustainable Homes assessors, to undertake an outline design stage assessment of the likely score for the 4b Parkhill Road development.

Code for Sustainable Homes

The Code for Sustainable Homes is an environmental rating for homes. It forms part of the Building Research Establishment's (BRE) suite of environmental tools. This assessment has been undertaken under the Code for sustainable Homes version November 2010 and the Code Addendum 2014.

Score Summary

This design guide outlines the likely rating for the site at present, including details of why the site scores certain credits and not others.

The site under assessment currently scores 69.29% and results in the development achieving Level 4 (minimum score of 68%) under the scheme. All mandatory levels are met within the assessment including the Code Level 4 requirements under the Energy and Water sections.

It is recommended that a score of at least 3-5% above the minimum required for a Level 4 be targeted. This will to ensure that a robust strategy for achieving the desired level is adopted, and represents a buffer to guard against unforeseen changes in design, which may cause credits to be dropped. This can be achieved by following the action plan outlined below.

Action Plan:

Issue	Action	Percentage uplift
Wat 01 – Internal Water Use	Install rainwater harvesting to offset internal water consumption to meet 90 litres per person, per day.	+0.55%
Was 2 – Site Waste Management Plan	Appoint contractor to ensure 85% (by weight or volume) of non-hazardous construction waste is diverted from landfill.	+1.60%
Eco 4 – Change in Ecological Value	Appoint an ecologist and landscape architect to ensure the species per hectare across the site is increased by +9.	+2.67%
TOTAL IMPROVEMENT		4.82%

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Rating Summary

4b Parkhill Road

Code for Sustainable Homes

Minimum Score Required:

Code Level 1	36 points
Code Level 2	48 points
Code Level 3	57 points
Code Level 4	68 points
Code Level 5	84 points
Code Level 6	90 points

Rating Summary for Code Level 4

Credit allocation	Available	Awarded	% Achieved	Score
Energy	31	20	65%	23.48
Water	6	3	33%	3.00
Materials	24	19	79%	5.70
Surface Water Runoff	4	3	75%	1.65
Waste	8	5	63%	4.00
Pollution	4	4	100%	2.80
Health and Wellbeing	12	8	67%	9.33
Management	9	9	100%	10.00
Ecology	9	9	78%	9.33
			Total:	69.29%
			Rating:	Level 4

Mandatory requirements:

The Code for Sustainable Homes also has certain mandatory requirements that must be met to allow the development to be certified. Compliance with these is detailed below.

Mandatory credits	Mandatory requirements achieved?	Code level achieved					
Carbon emissions (Ene1)	Yes	1	2	3	4	5	6
Indoor water use (Wat1)	Yes	1	2	3	4	5	6
Materials used (Mat1)	Yes	1	2	3	4	5	6
Surface water run off (Sur1)	Yes	1	2	3	4	5	6
Non-recycle waste storage (Was1)	Yes	1	2	3	4	5	6
Site waste management (Was2)	Yes	1	2	3	4	5	6

Further information on the mandatory credits can be found in the Appendix.

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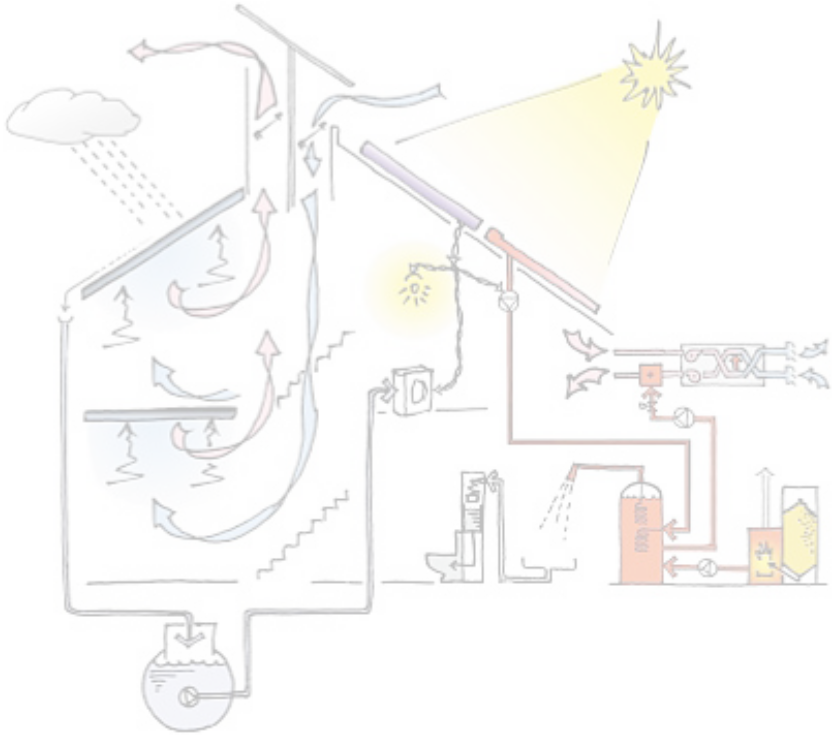
Energy
4b Parkhill Road
Code for Sustainable Homes

Energy:

Current focus of attention has been placed on the role of carbon in provoking man-made climate change. Scientific reports such as from the International Panel on Climate Change (IPCC) and the analysis from the Stern Report on the economics of climate change provide foundations for swift actions at all levels to reduce the quantities of carbon we release into the atmosphere.

Reducing the carbon emissions of homes is possible through greater energy efficiency and substituting hydrocarbon-based fuels for renewable resources. Presently, energy efficiency measures, such as well insulated/air-tight buildings or energy efficient lighting/white goods, are the more cost effective option over replacing grid electricity/gas supply with on-site renewable energy generation. Compliant off-site renewable energy supplies may also be considered to reduce carbon emissions.

The Code for Sustainable Homes focuses on carbon emissions reductions through a mandatory requirement for individual dwelling carbon emission rates. The carbon emissions as a result of transport are also considered within these credits, with particular concentration being on reducing car usage through encouraging the use of bicycles and providing residents with opportunities and space to work from home.



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Ene 1
Dwelling Emission Rate
10 credits available

Aim:

To minimise emissions of carbon dioxide (CO_2) to the atmosphere arising from the operation of a home and its services.

Explanation of Assessment:

Credits are awarded based on the percentage improvement in the Dwelling Emission Rate (DER), below the Target Emission Rate (TER), for the dwelling where DER and TER are as defined in Building Regulation Part L1A 2013.

DER is the estimated emission rate calculated in $kgCO_2$ per m^2 per annum arising from energy use for heating, hot water and lighting for the actual dwelling.

TER is the maximum emission rate permitted by Building Regulations.

Credits are awarded in accordance with the table below.

% improvement of DER over TER	Credits	Mandatory Levels (minimum required for rating)
≥ 6%	1	
≥ 12%	2	
≥ 19%	3	**Level 4**
≥ 32%	4	
≥ 44%	5	
≥ 56%	6	
≥ 70%	7	
≥ 84%	8	
≥ 100%	9	**Level 5**
Zero Net CO_2 Emissions	10	**Level 6**

Information required at Formal Design stage:

- SAP 2012 worksheets for each home (from an accredited SAP assessor) including the Dwelling Emission Rate (DER) and Target Emission Rate (TER).
- A copy of the 'Design Stage' Part L1A 2013 Building Regulations Compliance Checklist, showing full compliance for each dwelling.

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Ene 2
Fabric Energy Efficiency
9 credits available

Aim:

To improve fabric energy efficiency performance thus future-proofing reductions in CO_2 for the life of the dwelling.

Explanation of Assessment:

Credits are awarded based on improvement in the Fabric Energy Efficiency rating (FEE). FEE is the estimated energy demand for space heating and cooling expressed in kilowatt-hours of energy demand per square metre per year for the actual dwelling. Credits are awarded in accordance with the table below:

Dwelling Type		Credits	Mandatory Levels (minimum required for rating)
Apartment Blocks, Mid-Terrace	End Terrace, Semi- Detached & Detached		
Fabric Energy Efficiency kWh/m²/year			
≤ 48	**≤ 60**	**3**	
≤ 45	≤ 55	4	
≤ 43	≤ 52	5	
≤ 41	≤ 49	6	
≤ 39	**≤ 46**	**7**	
≤ 35	≤ 42	8	**Level 5 & 6**
≤ 32	≤ 38	9	

Information required at Formal Design stage:

- SAP 2012 worksheets for each home (from an accredited SAP assessor).
- A copy of the 'Design Stage' Part L1A 2013 Building Regulations Compliance Checklist, showing full compliance for each dwelling.

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Ene 3
Energy Display Devices
2 credits available

Aim:

To promote the specification of equipment to display energy consumption data, thus empowering dwelling occupants to reduce energy use.

Explanation of Assessment:

All dwellings in the development must include a system comprising a self-charging sensor(s) fixed to the incoming mains supply/supplies, to measure and transmit energy consumption data to a visual display unit.

Credits	
1	Where current electricity OR primary heating fuel consumption data are displayed to occupants by a correctly specified energy display device.
2	Where current electricity AND primary heating fuel consumption data are displayed to occupants by a correctly specified energy display device.
2	Where electricity is the primary heating fuel and current electricity consumption data are displayed to occupants by a correctly specified energy display device.

Information required at Formal Design stage:

- Specifications and drawings showing the type of energy display device and location for all dwelling types.
- Confirmation that an energy display devices will be install in each dwelling.

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Ene 4
Drying Space
1 credit available

Aim:

To minimise the amount of energy used to dry clothes.

Explanation of Assessment:

A credit is available for providing internal or external space and fixings for drying clothes. 4m of line required for 1 or 2 bed units, 6m for 3 bed or above units. Controlled ventilation (e.g. extract fan with humidistat, passive vent system or similar) is also required for internal facilities.

Credits	
1	Where space with posts and footings or fixings capable of holding 4m+ of drying line for 1-2 bed dwellings, and 6m+ of drying line for 3+ bed dwellings, is provided for drying clothes.

Drying lines for consideration:

http://www.homesupply.co.uk

(note that this a single line model and would need multiple fittings to comply with the 4/6m total length requirement)

http://www.castinstyle.co.uk (internal line)

http://www.hillshoist.net/ (external line)

Information required at Formal Design stage:

- Specifications and/or drawings stating the type of, location and details (including length) of the drying lines. Where applicable, Manufacturer's details will be required.
- Details of humidification within the bathrooms

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Ene 5
Eco-labelled Goods
2 credits available

Aim:

To encourage the provision or purchase of energy efficient white goods, thus reducing the CO_2 emissions from the dwelling.

Explanation of Assessment:

1 credit available where fridges and freezers and fridge/freezers are A+ rated under the EU energy efficiency labelling scheme.

AND

1 credit available where all washing machines and dishwashers are A rated under the EU energy efficiency labelling scheme and where washer/dryers and tumble dryers have a B rating.

OR

1 credit available if no white goods are provided but information on purchasing energy efficient white goods is provided to each dwelling.

Appliance	Min. Energy rating
Fridge / Freezer / Fridge-freezer	A+
Washing machine / Dishwasher	A
Tumble Dryer	B

White Goods Ideas for Consideration:

For more information on the water consumption requirements for the dishwasher and washing machine products, please see credit Wat 1 (Internal Potable Water Use) within this report.

Information required at Formal Design stage:

- Drawings or specifications describing the make and model of all white goods being provided and a copy of the EU energy Efficiency Labelling Scheme for all white goods provided.
- Confirmation that information on the EU Energy Efficiency Labelling Scheme will be provided to each dwelling

eight associates

Ene 6
External Lighting
2 credits available

Aim:

The purpose of this credit is to encourage the provision of energy efficient external lighting.

Explanation of Assessment:

These credits relate to lighting outside dwellings, including security lighting and internal communal areas. The development must meet the following criteria.

Credits	
1	**External & Communal Space lighting** Where all space lighting is provided by energy efficient light bulbs with appropriate control systems. If external, these must be fitted with dawn-to-dusk sensors or timers.
1	**Security lighting** Where all security light fittings are designed for energy efficiency and are adequately controlled such that: all burglar security lights have a maximum wattage of 150W, are fitted with movement detecting shut-off devices (PIR) AND daylight cut-off devices.

Information required at Formal Design stage:

- A relevant drawing clearly showing the location and type (manufacturer's details) of all external light fittings.
- Text describing (on drawings or in specification) the location and type (manufacturer's details) of all external lighting.

eight associates

Ene 7
Zero or Low Carbon Technologies
2 credits available

Aim:

To reduce carbon emissions and atmospheric pollution by encouraging local energy demand.

Explanation of Assessment:

Credits are awarded based on the percentage reduction in carbon emissions that result from using Zero or Low Carbon Technologies, for each dwelling using the calculation method detailed in *Calculation Procedures*, with credits awarded as detailed below:

Credits	
1	Where energy is supplied from local renewable or low carbon energy sources, or is designed and installed in a manner endorsed by a feasibility study prepared by an independent energy specialist. **AND** There is a **10%** reduction in carbon emission as a result of this.
2	There is a **15%** reduction in carbon emissions as a result of this method of supply.

Information required at Formal Design stage:

- Drawings showing location of LZC equipment associated with the dwellings together with confirmation of the type of LZC equipment specified and type of appliances that use an output from the technology.
- Manufacturer's technical data and details or calculations showing the energy and carbon dioxide emissions equivalent contribution from renewable electricity.
- Design stage SAP 2012 worksheet for each Energy type from an accredited energy assessor.

eight associates

Ene 8
Cycle Storage
2 credits available

Aim:

To encourage the wider use of bicycles as transport, and thus reduce the need for short car journeys, by providing adequate and secure cycle storage facilities.

Explanation of Assessment:

The cycle spaces must be secure, weatherproof and must not be accessed through the dwellings. They must be provided in accordance with the following criteria:

Credits	Type of dwelling	Cycle spaces per dwelling required to gain credit
1	Studio or 1 bed 2 & 3 bedroom 4 bedrooms +	1 cycle space for every two dwellings 1 cycle space per dwelling 2 cycle spaces per dwelling
2	Studio or 1 bed 2 & 3 bedroom 4 bedrooms +	1 cycle space per dwelling 2 cycle spaces per dwelling 4 cycle spaces per dwelling

Information required at Formal Design stage (if credit sought):

- Specification and drawings showing cycle storage location and details (type of fitting, confirming it is protected from the weather, that the storage is secure and has direct access).
- Manufacturer's literature confirming type of fittings and confirming compliance with this credit

p

eight associates

Ene 9
Home Office
1 credit available

Aim:

To reduce the need to commute to work by providing residents with the necessary space and services to be able to work from home.

Explanation of Assessment:

The following specifications are required to gain the credit. These can be located within the living room, one of the bedrooms or any other suitable areas.

Dwellings with 3 or more bedrooms, the facilities must be in a room other than the kitchen, living room or master bedroom. The room must be large enough not to prevent the intended use of that room.

The space should include:

Credits	
1	- Two adjacent double sockets - Two telephone points or equivalent broadband connection - Window with adequate ventilation - 1.8m wall to allow occupant to install desk and filing cabinet/bookcase (2.5m wall if in living space of one bedroom flat) - Adequate ventilation in the room (e.g. openable window or passive stack etc)

Information required at Formal Design stage:

- Most recent version of drawings showing the location and size of home office, location of sockets, location of telephone points and location and size of windows.
- Confirmation and details of adequate ventilation will be provided - In all cases the room must have an openable window or alternative ventilation e.g. passive stack. Where the room has a window, the minimum openable casement must be 0.5 m^2
- Confirmation of average daylight factor
- Confirmation of cable connection or that broadband will be available at each address.

eight associates

Water
4b Parkhill Road
Code for Sustainable Homes

Water:

UK has less available water per person than most other European countries. Water supplies are coming under strain from a combination of increasing population density in low rainfall areas, increasing water usage trends, changing weather patterns and infrastructure depreciation. Furthermore, water transportation has an energy requirement which can be reduced through water efficiency measures.

Ensuring adequate water supply levels is a national issue that could be addressed through water supply measures such as building reservoirs, desalination plants and expanding water transport. However, reversing the current trend of increasing water usage over expanding water supply infrastructure is a more commercially viable and environmental cost-effective manner of minimizing the risk of prolonged water shortages.

Water saving devices available to reduce water usage include aerated showerheads, shower timers, ultra low flush toilets and cistern displacement devices.

The Code for Sustainable Homes strictly imposes mandatory requirements for potable water use within the home and encourages the use of rainwater for landscaping. The simplest and most cost effective system for rainwater collection is the water butt, but more complex central collection communal systems are also available.

eight associates

Wat 1
Internal Water Use
5 credits available

Aim:

To reduce the consumption of water in the home.

Explanation of Assessment:

Credits are awarded based on the predicted average household water consumption.

Water consumption (litres/person/day)	Credits	Mandatory Levels required to achieve overall rating
≤ 120	1	Levels 1 & 2
≤ 110	2	
≤105	**3**	**Levels 3 & 4**
≤ 90	4	
≤ 80	5	Levels 5 & 6

The mandatory requirement for a Level 4 is for the internal potable water use to be ≤ 105 litres per person per day. An indicative specification for Level 4 is as follows:

- Shower of 9 litres/minute
- Bath sizes to be 140 litres to overflow
- Wash hand basin and kitchen taps with maximum flow rate of 4 litres/minute
- Dual Flush WC 6/3 litre
- Low water use dishwashers (for example: 1 litres/place setting)
- Low water use washing machine (for example: 8 litres/kg)
- Rainwater collection for internal use not assumed.

Information required at Formal Design stage:

- Drawings or specification text detailing the location, details and type of appliances / fittings that use water in the dwellings including any specific water reduction equipment.
- Confirmation that the systems will be designed to avoid microbial contamination in line with best practice.

eight associates

Wat 2
External Water Use
1 credit available

Aim:

To encourage the recycling of rainwater, and reduce the amount of water taken from the mains, for use in landscape/garden watering.

Explanation of Assessment:

To gain the credit, a rainwater collection system must be installed for dwellings with a garden, patio or communal garden space. If no individual garden or communal space is specified or if only balconies are provided the credit can be awarded by default

Water butt volume requirements:	
Homes with individual gardens, patios and terraces (which can be halved if there is no planting provided and the whole of the external space is covered by a hard surface):	
Terrace and Patios	100 litres minimum
1-2 bedroom home with private garden	150 litres minimum
3+bedroom home with private garden	200 litres minimum

The specification of the rainwater collector must meet the following criteria:

- No open access at the top of the collector (a child-proof lid is allowed)
- Provision of a tap or other arrangement for drawing off water
- Connection to the rainwater downpipes with an automatic overflow into the conventional rainwater drainage system
- A means of detaching the rainwater downpipe and access provision to enable the interior to be cleaned
- Where the collection system is to be sited outside, and not buried, it must be stable and adequately supported; the material used for the container shall be durable and opaque to sunlight
- Where the system is part of a rainwater collection system providing internal water, water for external use may be provided in a separate tank to water required for internal use. This could be an overflow pipe leading from the main tank to a correctly specified water butt for external water use.

Information required at Formal Design stage:

- Drawings showing the external private or communal garden space or terraces.
- Documentary evidence of the type, size and location of rainwater collection systems to be installed.

eight associates

Materials
4b Parkhill Road
Code for Sustainable Homes

Materials:

The large volumes of UK-produced and foreign-imported materials used in the construction sector has a very large negative environmental impact. This can be a result of the energy used in the manufacture of the material, its 'embodied energy', or the waste and land destruction caused by the quarrying of the raw material inputs.

The harmful effects of building materials can be reduced through choosing materials with a relatively low environmental impact. In order to assess the environmental impact of materials, 'life-cycle' analysis can be used to assess materials in order to incorporate the actual cost versus the monetary cost of materials. In addition, care can be taken as to the sourcing of materials, referred to as 'responsible sourcing'.

This includes selecting and purchasing materials from local suppliers, using reused or recycled materials and using timber from temperate and sustainably managed woodlands. Building designs that incorporate the use of existing structure will have a relatively low environmental impact.

The Code for Sustainable Homes encourages sustainably sourcing materials from certified origins and the use of build-ups with lower environmental impacts as according to the BRE's 'Green Guide to Specifications'.

eight associates

Mat 1
Environmental Impact of Materials
15 credits available

Aim:	To encourage the use of materials that have less impact on the environment, taking account of the full life-cycle.
Explanation of Assessment:	Credits are gained for each element. If at least 80% by area of each element scores an 'A rating' within the Green Guide to Housing Specification, the credit allocation is attained.
Level Targeted:	Mandatory Requirement must be met: At least three of the five key elements of the building envelope will achieve a rating of A+ to D in the 2008 version of The Green Guide.
Further Information:	To achieve credits under this issue, please consider specifying A/A+ rated materials, as listed on the online green guide (www.thegreenguide.org).
Information required at Formal Design stage:	- Most up to date specifications and drawings showing the materials, location and details for each element: - Roof - External Walls - Internal walls (including separating walls) - Upper and Ground Floors - Windows

eight associates

Mat 2
Responsible Sourcing of Materials: Basic Elements
6 credits available

Aim:

To encourage the use of timber from sustainably managed sources, or reused timber. In addition, to reward the use of suppliers with environmental management system.

Explanation of Assessment:

Up to six credits are given on a sliding scale for the volume of materials used within the basic building elements that are from independently certified sources.

The majority of materials in the following basic building elements must be responsibly sourced:	For each of these elements the proportion of the following materials (by volume) that form part of the element must be determined.
1. Frame 2. Ground floor 3. Upper floors (including any loft boarding) 4. Roof (structure and cladding) 5. External walls (including external cladding) 6. Internal walls (including internal partitions) 7. Foundation/substructure 8. Staircase (includes the tread, rises and stringers)	1. Brick 2. Composites 3. Concrete (including blocks, tiles etc.) 4. Glass 5. Plastics 6. Metals (steel, aluminium etc.) 7. Stone 8. Timber

The number of credits awarded will depend on the volume of materials certified under one of the following schemes, with more points being attained for the more rigorous certification schemes plus more points awarded for higher overall volumes of timber compared to other materials.

Level of recognition	Type of certification	
Tier 1	Timber only: Certified by FSC, PEFC, CSA or SFI with CoC and Schemes compliant with BES6001:200861 Excellent and Very Good Performance Ratings	Most rigorous schemes
Tier 2a	Schemes compliant with BES6001:2008 'Good' Performance Rating	
Tier 2b	Schemes compliant with BES6001:2008 'Pass' Performance Rating	
Tier 3	Non-timber elements with ISO14001 or EMAS certification at both extraction and processing stages	
Tier 4	Timber elements: MTCC certified Non-timber elements with ISO14001, EMAS or BS8555 certification at either extraction or processing stage	Least rigorous schemes

eight associates

Mat 2 (continued) Responsible Sourcing of Materials: Basic Elements 6 credits available

Information required at Formal Design stage:

Non-timber elements

- Specifications and drawings showing the location and details of all non-timber elements and materials specified
- Confirmation/Specifications showing which material is used where in the development – including volume/percentage
- EMS certificate (or equivalent) for the process and/or extraction stages of each non-timber product (where applicable).

FSC/CoC Certified Timber:

- Specifications and drawings showing the location and details of all main timber elements and materials
- Confirmation/Specifications showing where timber is used in the development – including volume/percentage
- FSC/PEFC certificate (or equivalent) for the key timber products

BES 6001 Certified Concrete:

- Specifications and drawings showing the location and details of all main concrete elements and materials
- Confirmation/Specifications showing where concrete is used in the development – including volume/percentage
- BES 6001 certificate (or equivalent) for the key concrete components.

eight associates

Mat 3
Responsible Sourcing of Materials: Finishing Elements
3 credits available

Aim:

To encourage the use of timber from sustainably managed sources, or reused timber.

Explanation of Assessment:

Up to three credits are given on a sliding scale for the volume of materials used within the basic building elements that are from independently certified sources.

The majority of materials in the following basic building elements must be responsibly sourced:	For each of these elements the proportion of the following materials (by volume) that form part of the element must be determined.
1. Stair (including handrails, balustrades, banisters, other guarding/rails (excluding staircase)) 2. Window (including sub-frames, frames, boards, sills) 3. External & internal door: (including sub-frames, frames, linings, door) 4. Skirting (including architrave, skirting board & rails) 5. Panelling (including any other trim) 6. Furniture (including fitted; kitchen, bedroom and bathroom) 7. Facias (soffit boards, bargeboards, gutter boards, others) 8. Any other significant use.	1. Brick 2. Composites 3. Concrete (including blocks, tiles etc.) 4. Glass 5. Plastics 6. Metals (steel, aluminium etc.) 7. Stone 8. Timber

See Mat 2 for details of certification schemes recognised by the BRE.

Information required at Formal Design stage:

FSC/CoC Certified Timber:

- Specifications and drawings showing the location and details of all timber elements and materials
- Confirmation/Specifications showing where timber is used in the development – including volume/percentage
- FSC/PEFC certificate (or equivalent) for the finishing elements timber products

eight associates

Surface Water Runoff & Flooding

4b Parkhill Road

Code for Sustainable Homes

Surface water Run-off and Flooding:

According to the Environment Agency, around 5 million people in 2 million properties live in flood risk areas in England and Wales. Changes in our climate, such as wetter winters and more severe storms will increase the risk and impact of flooding in the future.

Flooding needs to be carefully managed to ensure the sustainability and viability of residential developments. In housing developments, this can be done through specifying permeable paving for all hard surfaces in the development or by the adoption of soak ways or other systems (including green roofs) that reduce peak run-off loads.

The Code for Sustainable Homes encourages the reduction of surface water run-off from hard surfaces and supports developments to be built in areas with low risk of flooding.

eight associates

Sur 1
Reduction of Surface Runoff
2 credits available

Aim:

To reduce and delay water run-off from the hard surfaces of a housing development to public sewers and watercourses, thus reducing the risk of localised flooding, pollution and other environmental damage.

Explanation of Assessment:

Mandatory	Ensure the peak rate of runoff into watercourses is no greater for the developed site than it was for the pre-development site.
2	Available for using SUDS to improve water quality of the rainwater discharged: 1 credit can be awarded by ensuring there is no discharge from the developed site for rainfall depths up to 5mm (Please see full Code manual for calculation Procedures). 1 credit can be awarded by ensuring that the run-off from all hard surfaces shall receive an appropriate level of treatment in accordance with The SuDs Manual to minimise the risk of pollution.

Level Targeted:

Mandatory Level must be met.

Information required at Formal Design stage

- The appropriately qualified professional's report containing all information necessary to demonstrate compliance with the peak rate of run-off and volume of run-off requirements, demonstrating that:
- The *peak rate of runoff* into watercourses is no greater for the developed site than it was for the pre-development site; and
- That the post development *volume of run-off*, allowing for climate change over the development lifetime, is no greater than it would have been before the development; and
- That flooding of property would not occur in the event of local drainage system failure (caused either by extreme rainfall or a lack of maintenance).
- Copies of any drawings and specifications showing recommendations from the Report were carried out.
- A Flood Risk Assessment, in line with the new Planning Practise Guidance (PPG), confirming the risk of flooding from all sources of flooding (this may be contained within the appropriately qualified professional's report).
- Drawings showing the pre-development drainage for the site (natural or constructed)
- Drawings showing the proposed drainage solution, system failure flood flow routes, potential flood ponding levels and ground floor levels
- Confirmation from the appropriately qualified professional that local drainage system failure would not cause an increase in the risk of flooding within dwellings either on or off site.

Where credits are sought:

- The appropriately qualified professional's report detailing the design specifications, calculations and drawings to support the awarding of the credit(s).

eight associates

Sur 2
Flood Risk
2 credits available

Aim:

To encourage developments in areas with low risk of flooding or if developments are to be situated in areas with a medium risk of flooding, that appropriate measures are taken to reduce the impact in an eventual case of flooding.

Explanation of Assessment:

Credits	
2	Where evidence provided demonstrates that the assessed development is located in a zone defined as having a low annual probability of flooding (less than 1 in 1,000 chance)
	OR
1	Where evidence provided demonstrates that the assessed development is located in a zone defined as having a medium annual probability of flooding (less than 1 in 100 chance) and the ground level of the building, car parking and access is above the design flood level for the site's location.

Information required at Formal Design stage:

Where there is a low risk of flooding (Zone 1):

- Copy of the site specific Flood Risk Assessment (FRA) in line with the new Planning Practise Guidance (PPG).

Where there is a medium (Zone 2) or high (Zone 3a) risk of flooding, please provide the following in addition to the above FRA report:

- Site plans indicating the design flood level, the range of ground levels of the dwellings, car parking areas and site access (lowest to highest), showing that the criteria (finished floor levels of all habitable rooms and access routes being at least 600mm above the design flood level) are met, along with any notes explaining the function of any areas lying below the design flood level.
- Confirmation from the local planning authority that the development complies with PPS25 and is appropriately flood resilient and resistant, and has managed any residual risk safely.

eight associates

Waste
4b Parkhill Road
Code for Sustainable Homes

Waste:

Household and construction waste contribute to landfill issues and resource inefficiency. Current landfill sites are reaching saturation and prospective new sites bear a large cost in terms of replacing potentially productive land and causing environmental degradation. Many resources that are being buried in landfill also have a value if re-used or recycled for follow-on uses. In addition, the Landfill Tax escalator means it is becoming more expensive to send waste to landfill.

The burden is both on households` and the construction industry. According to DEFRA, in 2004 the construction and demolition industry contributed to 32% of the volume of waste arising in the UK. Whereas, households contribute only to 9% of the UK's total of 355 million tonnes of waste.

www.defra.gov.uk/environment/statistics/waste/kf/wrkf02.htm

In order to reduce the amount of waste that goes to landfill, the 'waste hierarchy' as set out in the government's Waste Strategy (2007), should be followed: waste prevention (as the more desirable option), reuse, recycle/compost, energy recovery and disposal (as the least desirable option).

The Code for Sustainable Homes aims to encourage the reduction and effective management of waste, as well as promoting the recycling and composting of materials both in construction works and in a household's daily activity. It also aims to reduce the amount of organic waste reaching landfill, primarily through promoting home or communal composting.

eight associates

Was 1
Household Waste Storage & Recycling Facilities
4 credits available

Aim:

To encourage developers to provide homeowners with the opportunity and facilities to recycle household waste.

Explanation of Assessment:

Mandatory	The minimum capacity of waste storage as calculated from BS5906 (British Standards 2005) i.e. 100 litres volume for a single bedroom dwelling, with a further 70 litres volume for each additional bedroom. All containers must be accessible to disabled people, particularly wheelchair users and sited on a hard, level surface. To allow easy access, the containers must not be stacked.
4	Where there is a combination of adequate internal storage plus either a Local Authority Collection Scheme or external storage consisting of: Either three internal storage bins for recyclable waste: - with a minimum total capacity of 30 litres. Where no individual bin is smaller than 7 litres. OR a single 30 litre bin linked with a Local Authority service that collects at least 3 types of recyclable material in a single bin located in an adequate internal space. **AND** EITHER Provision of adequate external storage space for bins plus a Local Authority Scheme collecting at least 3 types of recyclable waste. OR For individual dwellings:- an adequate external space for storing three external bins (as specified below) for recyclable waste: - a minimum total capacity of 180 litres - no individual bin smaller than 40 litres - located within 10m of an external door

eight associates

Was 1 (cont.)
Household Waste Storage & Recycling Facilities
4 credits available

Level Targeted:	Mandatory Level must be met.
Information required at Formal Design stage:	External waste storage - Drawing showing space for waste storage allowing for containers with the adequate volume. All containers must be accessible to disabled people. Internal recycling storage - Drawings and manufacturer's details demonstrating provision of a compliant internal bin of minimum capacity (see above) for recyclables in an adequate internal space. Mandatory information - If Provide table: Cat 5.1 – Supplementary Information Sheet for Was 1 and Checklist IDP.

eight associates

Was 2
Construction Site Waste Management
3 credits available

Aim:

To promote reduction and effective management of construction related waste by improving on performance, which meets the Site Waste Management Plans (SWMP) requirements.

Explanation of Assessment:

1 Credit	**Reduce Waste Produced** One credit is available when the Site Waste Management Plan (SWMP) contains: - Target benchmarks for resource efficiency, i.e. m^3 of waste per 100 m^2 or tonnes of waste per 100 m^2 set in accordance with best practice, - Procedures and commitments to minimize non-hazardous construction waste at design stage. Specify waste minimisation actions relating to at least 3 waste groups and support them by appropriate monitoring of waste. - Procedures for minimising hazardous waste. - Monitoring, measuring and reporting of hazardous and non-hazardous site waste production according to the defined waste groups (according to the waste streams generated by the scope of the works)
2 Credits	**Divert Waste from Landfill** In addition to the above, a second credit is available for: - An SWMP that includes procedures and commitments to sort and divert waste from landfill, according to the waste groups listed above. - This must involve setting targets for at least 3 key waste groups at design stage, reviewing them during construction and including the results in the final SWMP (as above). - This may be done either on site or through a licensed waste contractor, though hazardous waste must be segregated on site. - Manufacturers' take back schemes may also be used. - At least 50% by weight or by volume of non-hazardous construction waste generated by the project has been diverted from landfill.
3 Credits	In addition to the above, a third credit is available for: - At least 85% by weight or by volume of non-hazardous construction waste generated by the project has been diverted from landfill.

eight associates

Was 2
Construction Site Waste Management
3 credits available

Information required at Formal Design stage:

Evidence required

A copy of the Site Waste Management Plan or the specification describing what the Site waste Management Plan will contain. This must include:

- Resource efficiency targets set for each stage of construction (including demolition)
- Details of how the waste will be measured and monitored
- The name and position of the person who is responsible for implementing the plan
- How the plan will be implemented
- Commitment to minimise waste generated on site supported by the Site Waste Management Plan, which should include procedures and targets for the efficient ordering, handling and storing of materials.
- Commitment to sort, re-use and recycle construction waste. This can be in the form of a site-specific waste policy or procedure, specification, letter of appointment or a waste/recycling contractor, or other formally written document.

eight associates

Was 3
Composting
1 credit available

Aim:

To encourage developers to provide the facilities to compost household waste, reducing the amount of household waste sent to landfill.

Explanation of Assessment:

The provision of individual home composting facilities will gain the credit. For dwellings without gardens a communal or community composting service is to be provided within 50m of the external door and a management plan should be in place.

One credit is awarded by complying with one of the following:

1 Credit
Individual home compositing facilities OR
A local communal or community composting service, which the Local Authority runs or where there is a management plan in place OR
A Local Authority green/kitchen waste collection scheme, including an automated waste collected system.

Information required at Formal Design Stage:

- Documentary evidence stating details of the Local Authority kitchen/garden waste collection scheme.
- Drawings showing the location and size of external storage and distance of storage from dwelling. Must be located within a maximum distance of 30 m from the entrance door of the dwelling and/or the building (if a block of flats)
- Drawings showing the location and size of internal storage in a dedicated position. The internal kitchen waste container space should be large enough to hold at least a 7-litre container.
- Written confirmation that a supporting information leaflet will be provided to each dwelling.
- Completed Checklist IDP (Inclusive access and usability)

eight associates

Pollution
4b Parkhill Road
Code for Sustainable Homes

Pollution:

Homes have an impact on the amount of damage that is happening to the biosphere from greenhouse gases and other pollutant gases. The main greenhouse gas being discharged from houses is carbon dioxide, emitted from the burning of fossil fuels.

Carbon dioxide and other detrimental substances are used in some insulating materials and/or are a by-product from heating a dwelling. In the long-term, the concentration of these substances in the atmosphere exacerbates global warming, contributing to significant climate change. Air pollutants also have known harmful effects to human health and the environment, as well as causing long-term damage to the Earth by exposing living organisms to acid rain.

The Code for Sustainable Homes encourages the use of alternative substances and products to reduce the effects of pollution.

eight associates

Pol 1
Global Warming Potential of Insulants
1 credit available

Aim:

To minimise the quantity of greenhouse gases embodied in the insulation of the site.

Explanation of Assessment:

One credit is awarded where all insulating materials have a Global Warming Potential (GWP) of less than 5. These include hot water cylinders, pipe lagging, wall and roof insulants.

Recyclable Storage Considerations:

The following products give examples of possible insulants to be specified to meet code requirements.

ROCKWOOL

ZERO GWP GLOBAL WARMING POTENTIAL

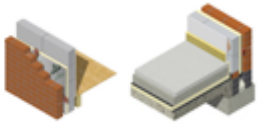
ZERO ODP OZONE DEPLETING POTENTIAL

Rockwool. www.rockwool.co.uk

ISOVER

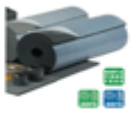
Isover (previously isowool) www.isover.co.uk

Kingspan



Kingspan. www.kingspan.com Not all composite panel products are compliant

Armaflex



Armaflex www.aramcell.com

Information required at Formal Design stage:

- Insulation schedule including proposed insulation materials, manufacturer, product name and name of blowing agent used (if applicable).
- Insulation details of hot water tanks and pipe lagging
- Drawings clearly showing the type and location of all insulation materials used.

eight associates

Pol 2
NOx emissions
3 credits available

Aim:

To reduce the emission of nitrogen oxides (NOx) into the atmosphere.

Explanation of Assessment:

Credits are awarded on the basis of NOx emissions arising from the operation of space heating and hot water systems for each dwelling, in accordance with the table below:

Credits	NO_x Emission
1	≤100mg/kWh
2	≤70mg/kWh
3	≤40 mg/kWh

Information required at Formal Design stage:

- Equipment schedule confirming the manufacturer and model number of the space heating and hot water systems.
- Manufacturer's information confirming the NO_X levels (mg/kWh, measured at 0% oxygen) of the systems to be installed.
- Drawings showing the location of the heating systems.

eight associates

Health & Wellbeing

4b Parkhill Road

Code for Sustainable Homes

Health & Wellbeing:

In the UK people spend, on average, around 90% of their time in buildings or within the built environment. Buildings make a major contribution to our quality of life because of the environments they provide for our work, leisure and home life. They must provide a healthy and comfortable environment in which to live or work. Improved quality of environments within and around homes can impact on physical and mental health.

Key issues which the Code for Sustainable Homes addresses include lighting, noise, outdoor space and adaptable housing.

eight associates

Hea 1
Daylighting
3 credits available

Aim:

To improve the quality of life in homes through good daylighting, and to reduce the need for energy to light a home.

Explanation of Assessment:

All dwellings in the development must meet the following criteria through daylighting calculations carried out by an independent daylighting consultant (calculation procedures for daylight factor and typical values are detailed in Littlefair (1998).)

Credits	
1	Kitchen to meet the daylighting criteria set out in British Standard BS 8206: part 2 (Daylight Factor 2%)
1	Living rooms, dining rooms and studies to meet the daylighting criteria set out in British Standard BS 8206: part 2 (Daylight Factor 1.5%)
1	Kitchens, living rooms, dining rooms and studies to be designed to have a view of the sky according to criteria set out in British Standard BS 8206: Part 2

Information required at Formal Design stage:

- Drawings showing the room areas and heights.
- A window schedule confirming the opening sizes and frame factors.
- Daylighting calculations carried out by an independent daylighting consultant that confirm that the required average daylight factors have been achieved in each of the applicable rooms.

eight associates

Hea 2
Sound Insulation
4 credits available

Aim:

To ensure the provision of sound insulation and reduce the likelihood of noise complaints from neighbours.

Explanation of Assessment:

Credits are awarded for achieving higher standards of sound insulation than those given in Approved Document E of the Building Regulations and demonstrating it by using post completion testing or robust details.

A commitment to carry out a programme of pre-completion testing based on normal programme of testing described in Part E for every group or sub-group of houses or flats and that the performance of each dwelling:

Crieria	Credits
Achieves airborne sound insulation values that are at least **3dB** higher, and impact sound insulation values are at least **3dB** lower, than the performance standards set out in Part E.	1
Achieves airborne sound insulation values that are at least **5dB** higher, and impact sound insulation values are at least **5dB** lower, than the performance standards set out in Part E.	3
Achieves airborne sound insulation values that are at least **8dB** higher, and impact sound insulation values are at least **8dB** lower, than the performance standards set out in Part E.	4

Information required at Formal Design stage:

- A letter from the developer confirming the intent to meet the relevant sound insulation performance levels and to use a Compliant Test Body to complete pre-completion testing (UKAS accredited or equivalent).

eight associates

Hea 3
Private Space
1 credit available

Aim:	To improve the occupiers quality of life by providing a private outdoor space.
Explanation of Assessment:	A credit is achieved for an outdoor space which allows easy access to all occupants and which is only accessible to occupants of designated dwellings (see IDP Checklist). This could be a private or communal garden, roof terrace or balcony (of sufficient size). The size of the balconies must meet CSH requirements by being at least 1.5m^2/bedroom in area. The areas will also be easily accessible to all occupants, including wheelchair users.
Information required at Formal Design stage:	Detailed documentary evidence confirming: - The number of bedrooms served by the outdoor space; - That the outdoor space meets the minimum size and accessibility requirements AND - Completed Checklist IDP

eight associates

Hea 4
Lifetime Homes
4 credits available

Aim:	To encourage the construction of homes that are accessible to everybody and where the layout can easily be adapted to fit the needs of future occupants.
Explanation of Assessment:	The credits are achieved when all the principles of Lifetime Homes have been complied with.
Information required at Formal Design stage:	- A completed and signed Code Hea 4 Checklist. - Design drawings demonstrating compliance with all 16 criteria of the Lifetime Homes checklist

eight associates

Management
4b Parkhill Road
Code for Sustainable Homes

Management:

The management and operation of a building and the construction process itself have a major impact on its environmental performance. Information can encourage the tenants running the building to have an integrated energy and environmental perspective in their daily business.

In addition, site management during construction works is important to ensure the optimum use of natural resources and to minimise impact on the local environment through control of pollution, waste production and energy consumption.

eight associates

Man 1
Home User Guide
3 credits available

Aim:

To recognise and encourage the provision of guidance to enable home owners/ occupiers to understand and operate their home efficiently, in line with current good practice and in the manner envisaged by the developer, and to make best use of local facilities.

Explanation of Assessment:

Up to three credits are available where the following is provided:

Credits	
2	Where evidence can be provided to demonstrate that there is provision, in each home, of a simple guide that covers information relevant to the 'non-technical' tenant/occupant on the operation and environmental performance of their home.
1	Where evidence can be provided to demonstrate that the guide also covers information relating to the site and its surroundings.

The following list of information will be provided in the Home User Guide:

Part 1 – Operational Issues (2 credits)	Part 2 – Site & Surroundings (3 credits)
1. Environmental Design Features (Including CODE certificate) 2. Energy - SAP Rating (SAP) - Details of renewable energy systems - Insulation & Draughting measures - Energy saving tips 3. Water Use - Internal & External water saving features 4. Recycling & Waste - Local Authority Scheme details - Location of Recycling Bins 5. Sustainable DIY tips 6. Emergency information - Smoke detector locations 7. Links, References & Further info	1. Recycling & Waste - Details of where to recycle materials not covered by LA weekly collection scheme 2. Public Transport - Maps & Timetables - Cycle storage & local cycle paths - Car parking & any local car sharing or park & ride schemes - How to get to local amenities by public transport 3. Local amenities - Location of amenities listed under credit Tra 3 4. Responsible Purchasing - White goods, light fittings, timber and local or organic food (farmers markets etc) 5. Emergency information - A&E department and emergency services 6. Links, Reference & Further info

eight associates

Man 1 (continued)
Home User Guide
3 credits available

Information required at Formal Design stage:	Confirmation that a Home User Guide will be: - Supplied to all dwellings within the development - Be developed to the required standards (as a minimum including a list of contents showing that the guide will cover all of the issues, as stated on the previous page) - Available in an alternative format upon request by the first home occupier.

eight associates

Man 2
Considerate Constructors
2 credits available

Aim:

To recognise and encourage construction sites managed in an environmentally and socially considerate and accountable manner.

Explanation of Assessment:

Credits	
1	Where evidence can be provided to demonstrate that there is a commitment to comply with the Considerate Constructors Scheme (CCS) and score between 25 to 34 points, with no less than 5 scored in each section.
2	Where evidence provided demonstrates that there is a commitment to go significantly beyond best practice site management principles - a commitment to achieve at least 35 out of 50 points under CCS, with no less than 7 scored in each section.

Please note that the CCS has changed (as from Jan 2013), the new requirements are stated above.

Information required at Formal Design stage:

- Confirmation of commitment from the contractor or developer to comply with the Considerate Contractors Scheme and achieve at least 35 out of 50.
- Registration details under the CCS scheme.

eight associates

Man 3
Construction Site Impacts
2 credits available

Aim:

To recognise and encourage construction sites managed in a manner that mitigates environmental impacts.

Explanation of Assessment:

Credits are awarded where this a commitment and strategy to operate site management procedures on site as follows:

Credits	
1	Where there are procedures that cover 2 or more of the following items: • Monitor, report and set targets for CO_2 production or energy use arising from site activities. • Monitor and report CO_2 or energy use arising from commercial transport to and from site. • Monitor, report and set targets for water consumption from site activities. • Adopt best practice policies in respect of air (dust) pollution arising from site activities. • Adopt best practices in respect on air and water (ground and surface) pollution occurring on the site. • 80% of site timber is reclaimed, re-used or responsibly sourced.
2	Where there are procedures that cover 4 or more of the items listed above.

Information required at Formal Design stage:

Completed and signed copy of Checklist Man 3. This will include:

- Confirmation of the site's procedures to minimise water pollution following best practice guidelines outlined in the Environment Agency's PPGs 1,5 and 6.
- Confirmation from the site team to indicate how this information is disseminated to site operatives
- Confirmation that at least 80% of timer during construction is procured from sustainably managed sources or is re-used.

eight associates

Man 4
Security
2 credits available

Aim:

To encourage the design of developments where people feel safe and secure; where crime and disorder, or the fear of crime, does not undermine quality of life or community cohesion.

Explanation of Assessment:

Credits are awarded where the design team commit to working with an ALO in the early design stages as follows:

Credits	
2	These credits are awarded if a commitment to work with an Architectural Liaison Officer from the Local Police force and to follow their recommendations into the design of the dwelling.

Information required at Formal Design Stage:

- Specification clause or other confirmation of commitment showing that an ALO/CPDA has been or will be appointed to provide advice at RIBA stage C to ensure that the requirements of Section 2 – SBD are achieve.
- Confirmation that the advice of the ALO/CPDA will be followed

eight associates

Ecology
4b Parkhill Road
Code for Sustainable Homes

Ecology:

The preservation of biodiversity is an important concern in a country with a high population density such as the UK. Development is often linked with habitat destruction, but opportunities for habitat conservation and enhancement within new developments provide a chance to contribute to wildlife corridors within urban areas and to increase the ecological value of built land (the ecological value of a site is affected by previous uses and the presence of ecological features such as trees, hedges, watercourses, wetlands, meadows etc.).

The Code for Sustainable Homes encourages the use of land with a low existing ecological value and rewards measures taken to protect and to increase the biodiversity of the site.

eight associates

Eco 1
Ecological Value of Site
1 credit available

Aim:	To encourage development on land that already has a limited value to wildlife, and discourage the development of ecologically valuable sites.
Explanation of Assessment:	A credit is awarded for developing land of inherently low ecological value (Code checklist) or providing an ecological report of the site prepared by a registered Ecological Consultant, which should state that the land being developed is of insignificant ecological value or will remain undisturbed by the construction works in areas of ecological value.
Information required at Formal Design Stage:	- Plans of the site and surrounding area prior to development, identifying any features, both built and ecological - Site visit report from the design team / assessor /ecologist confirming details adequate to meet Checklist 1.

eight associates

Eco 2
Ecological Enhancement
1 credit available

Aim:	To enhance the ecological value of a site.
Explanation of Assessment:	Appointment of a suitably qualified ecological consultant to review landscaping proposals and provide recommendations for ecological enhancement, and a commitment to follow these recommendations is required to gain the credit. A qualified Ecological Consultant with at least 3 years experience and with AWTC, IEMA or IEEM or Landscape Institute professional membership should be able to review the proposed landscaping scheme to provide native, wildlife-friendly planting amongst other recommendations.
Information required at Formal Design stage:	- Copy of the Ecology report including details of Ecologist's qualifications and a list of ecologist recommendations for enhancing site ecology - A commitment from the developer to incorporate the ecologist's recommendations

eight associates

Eco 3
Protection of Ecological Features
1 credit available

Aim:	To protect existing ecological features from substantial damage during the clearing of the site and the completion of construction works.
Explanation of Assessment:	Where the contract specification ensures that all trees with over 100mm trunk diameter, hedges, ponds, streams etc are maintained and adequately protected from damage during clearing and construction works. Where none of the above features are present, the credit is achieved by default. Where ecological features are being removed, evidence must be provided either that they are of low value (this must be stated by the suitably qualified ecologist (SQE) within the ecology report) OR that they can be removed for health and safety and/or conservation reasons (this must be provided as written evidence from an appropriate statutory body / arboriculturalist confirming the requirement to remove any features must then be provided).
Information required at Formal Design stage:	- Plans of the site and surrounding area prior to development, identifying any features, both built and ecological - Copy of the suitably qualified ecologist's report confirming the ecological features present on site and how they will be protected.

eight associates

Eco 4
Change in Ecological Value of Site
4 credits available

Aim:

The aim of this credit is to reward steps taken to minimise reductions in ecological value and to encourage an improvement.

Explanation of Assessment:

Credits are awarded depending on the improvement of ecological value on site as follows:

Credits	Ecological Value (natural plant species per hectare)
1	For a change in value of between –9 and –3 natural plant species (per hectare)
2	For a change in value of between –3 and +3 natural plant species (per hectare)
3	For a change in value of between +3 and +9 natural plant species (per hectare)
4	For a change in value greater than +9 natural plant species (per hectare)

Information required at Formal Design stage:

- Code for Sustainable Homes Ecology Report Template completed by the ecologist, containing pre and post development landscape breakdown.
- Written confirmation from the developer confirming how the ecologist's recommendations will be implemented, including a planting schedule where relevant.
- Plans of the site and surrounding area post construction, showing proposed planting schemes.

eight associates

Eco 5
Building Footprint
2 credits available

Aim:

To promote the most efficient use of a building's footprint by ensuring land and material use is maximised for every dwelling on a development.

Explanation of Assessment:

Credits are awarded where the ratio of combined net internal floor area of all dwellings on the site to their footprint (as measured by the total net internal ground floor area) as follows:

Credits	
1	For houses: Net Internal Floor Area : Footprint ratio for all houses on the site is greater than 2.5:1 AND For flats : the total combined Net Internal Floor Area : Footprint ratio for all flats on the site is greater than 3:1 OR For a combination of houses and flats: a ratio of total net internal floor area : total ground floor area greater than the area weighted average of the two ratios above (see calculator if required.)
2	For houses: Net Internal Floor Area : Footprint ratio for all houses on the site is greater than 3:1 AND For flats : the total combined Net Internal Floor Area : Footprint ratio for all flats on the site is greater than 4:1 OR For a combination of houses and flats: a ratio of total net internal floor area : total ground floor area greater than the area weighted average of the two ratios above (see calculator if required.

Please note: Where residential accommodation is constructed above other occupied space such as shops or offices (garages or car parking would not be included), the floor area of these spaces can be included within the net internal floor area of the dwelling provided the areas are directly beneath the residential space.

Information required at Formal Design stage

- General layout drawings and elevations including dimensions for each type of dwelling, all other buildings and a site plan
- Calculations of the building footprint ratio.

eight associates

Appendix 1
Information about the Code for Sustainable Homes

Background:

The Code for Sustainable Homes was launched in December 2006 with the publication of 'Code for Sustainable Homes: A step change in sustainable home building practice' (Department of Communities and Local Government 2006).

This introduced a single national standard to be used in design and construction of new homes in England, based on the BRE's EcoHomes scheme. Adoption of the Code is intended to encourage continuous improvements in sustainable home building.

Issues:

The Code for Sustainable Homes is a set of sustainable design principles covering performance in nine key areas listed below:

Energy	Surface Water run-off	Health & well being
Water	Waste	Management
Materials	Pollution	Ecology

In each of these categories, performance targets are proposed which are in excess of the minimum needed to satisfy Building Regulations, but are considered to be best practice, technically feasible, and within the capability of the building industry to supply.

Mandatory Requirements

The Code for Sustainable Homes includes several mandatory requirements. Four of these consist of a single mandatory requirement that must be met regardless of the Code level aimed for. These are as follows:

Credit reference / title	Mandatory Requirement
Mat1: Environmental Impact of Materials	At least three of the following five elements must achieve a rating of D or better in the 2008 Green Guide: *Roof, external walls, internal walls, upper & ground floors and windows.*
Sur1: Management of Surface Water Run off	Ensure that the peak rate of run off is no greater for the developed site than it was for the pre-developed site.
Was1: Storage of Non-recyclable Waste	Provide sufficient space for waste storage to comply with BS5906 (2005); i.e. a volume of 100 litres for a single bedroom dwelling and another 70l for each additional bedroom.

eight associates

Appendix 1 (continued) Information about the Code for Sustainable Homes

So long as these are achieved, two further issues have mandatory requirements. The minimum standards for these vary for each level of the Code, with more stringent benchmarks the higher the Code level sought. These are as follows:

Code level	1	2	3	4	5	6
Ene1: CO2 Emission rate % improvement in DER over TER				25	100	'True zero'
Wat1: Indoor water use Maximum litres/person/day	120	120	105	105	80	80

The final credits for which a mandatory requirement applies for Level 6 only are Ene 2, where a Fabric Energy Efficiency of maximum 39 (for apartment block and Mid-terrace) and 46 for end terrace, semi-detached and detached) must be achieved and Hea 4, Lifetime Homes, for which all of the credit requirements must be complied with.

Scoring System:

The Code uses a rating system of one to six stars and it differs from EcoHomes in several key regards outlined below:

- It is assessed at the level of an individual 'Dwelling'.
- It contains a minimum mandatory standard for energy, water, materials, waste, surface water run-off, which must be met before even the lowest of the Code can be achieved.
- It demands higher minimum standards for energy and water to be met before the higher levels of the Code can be achieved.
- It is performed in two stages with 'Final' Code certification taking place after the Post Construction Review has been carried out.

In addition to the mandatory requirements, each design category scores a number of percentage points. The total number of percentage points establishes a 'star rating' for the dwelling.

Code Levels	Total Points Score (equal to or greater than)
Level 1 (★)	36 Points
Level 2 (★★)	48 Points
Level 3 (★★★)	57 Points
Level 4 (★★★★)	68 Points
Level 5 (★★★★★)	84 Points
Level 6 (★★★★★★)	90 Points

SAP Input

Property Details: 4b Parkhill Road

Address: 4b, Parkhill Road, LONDON, NW3 2YN
Located in: England
Region: Thames valley
UPRN: 5217383178
Date of assessment: 24 March 2015
Date of certificate: 24 March 2015
Assessment type: New dwelling design stage
Transaction type: Non marketed sale
Tenure type: Owner-occupied
Related party disclosure: Financial interest in the property
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/person/day: True
PCDF Version: 374

Property description:

Dwelling type: House
Detachment: Mid-terrace
Year Completed: 2015

Floor Location:	Floor area:	Storey height:
Basement floor	44.69 m²	2.55 m
Floor 1	42.97 m²	2.47 m
Floor 2	42.97 m²	2.65 m
Floor 3	42.97 m²	2.85 m

Living area: 21.06 m² (fraction 0.121)
Front of dwelling faces: North West

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main door	Manufacturer	Solid			Wood
B1	Manufacturer	Windows	triple-glazed	Yes	
LG1	Manufacturer	Windows	triple-glazed	Yes	
LG2	Manufacturer	Windows	triple-glazed	Yes	
LG3	Manufacturer	Windows	triple-glazed	Yes	
LG4	Manufacturer	Windows	triple-glazed	Yes	
GF1	Manufacturer	Windows	triple-glazed	Yes	
GF2	Manufacturer	Windows	triple-glazed	Yes	
GF3	Manufacturer	Windows	triple-glazed	Yes	
GF4	Manufacturer	Windows	triple-glazed	Yes	
FF1	Manufacturer	Windows	triple-glazed	Yes	
FF2	Manufacturer	Windows	triple-glazed	Yes	
FF3	Manufacturer	Windows	triple-glazed	Yes	
FF4	Manufacturer	Windows	triple-glazed	Yes	
FF5	Manufacturer	Windows	triple-glazed	Yes	
RL1	Manufacturer	Roof Windows	triple-glazed	Yes	Metal
RL2	Manufacturer	Roof Windows	triple-glazed	Yes	Metal

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Main door	mm	0.7	0	1	1.7	1
B1	6mm	0.7	0.63	0.7	3.2	1
LG1	6mm	0.7	0.63	0.8	0.51	1
LG2	6mm	0.7	0.63	0.8	2.24	1
LG3	6mm	0.7	0.63	0.8	0.51	1
LG4	6mm	0.7	0.63	0.7	7.15	1
GF1	6mm	0.7	0.63	0.8	0.46	1
GF2	6mm	0.63	0.7	0.8	1.29	1

SAP Input

GF3	6mm	0.7	0.63	0.8	0.46	1
GF4	6mm	0.7	0.63	0.7	6.9	1
FF1	6mm	0.7	0.63	0.8	0.39	1
FF2	6mm	0.7	0.63	0.8	1.09	1
FF3	6mm	0.7	0.63	0.8	0.39	1
FF4	6mm	0.7	0.63	0.8	0.88	1
FF5	6mm	0.7	0.63	0.7	7.05	1
RL1	6mm	0.7	0.63	0.8	5.31	1
RL2	6mm	0.7	0.63	0.8	3.17	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main door		External wall (front)	North West	0.85	2
B1		External wall (rear)	South East	4	0.8
LG1		External wall (front)	West	0.35	1.45
LG2		External wall (front)	North West	0.995	2.25
LG3		External wall (front)	North	0.35	1.45
LG4		External wall (rear)	South East	3.006	2.38
GF1		External wall (front)	West	0.35	1.3
GF2		External wall (front)	North West	0.995	1.3
GF3		External wall (front)	North	0.35	1.3
GF4		External wall (rear)	South East	3.002	2.3
FF1		External wall (front)	West	0.35	1.1
FF2		External wall (front)	North West	0.995	1.1
FF3		External wall (front)	North	0.35	1.1
FF4		External wall (front)	North West	0.8	1.1
FF5		External wall (rear)	South East	3.002	2.35
RL1		Basement roof	Horizontal	4.25	1.25
RL2		Main roof	Horizontal	1.35	2.35

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Basement wall	86.28	0	86.28	0.18	0	False	N/A
External wall (front)	37.49	9.92	27.57	0.18	0	False	N/A
External wall (rear)	38.69	24.3	14.39	0.18	0	False	N/A
Basement roof	17.5	5.31	12.19	0.13	0		N/A
Main roof	42.97	3.17	39.8	0.13	0		N/A
Basement floor	44.69			0.13			N/A
Ground floor	15.78			0.13			N/A
Internal Elements							
Party Elements							
Party walls	149.66						N/A

Thermal bridges:

Thermal bridges: No information on thermal bridging (y=0.15) (y =0.15)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Balanced with heat recovery
Number of wet rooms: Kitchen + 4
Ductwork: Insulation, Rigid
Approved Installation Scheme: False

Number of chimneys: 0

Number of open flues: 0

Number of fans: 0

Number of passive stacks: 0

SAP Input

Number of sides sheltered:	2
Pressure test:	3

Main heating system:

Main heating system:	Boiler systems with radiators or underfloor heating Gas boilers and oil boilers Fuel: mains gas Info Source: Manufacturer Declaration Manufacturer's data Efficiency: 90.0% (SEDBUK2009) Regular condensing with permanent pilot light Fuel Burning Type: Modulation Underfloor heating and radiators, pipes in screed above insulation Central heating pump : 2013 or later Design flow temperature: Unknown Unknown Boiler interlock: Yes Delayed start

Main heating Control:

Main heating Control:	Time and temperature zone control by suitable arrangement of plumbing and electrical services Control code: 2110

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :mains gas Hot water cylinder Cylinder volume: 210 litres Cylinder insulation: Factory 60 mm Primary pipework insulation: True Cylinderstat: True Cylinder in heated space: True Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 2.5 Tilt of collector: Horizontal Overshading: Heavy Collector Orientation: South East
Assess Zero Carbon Home:	No

DER WorkSheet: New dwelling design stage

User Details:

Assessor Name: **Stroma Number:**

Software Name: Stroma FSAP 2012 **Software Version:** Version: 1.0.1.14

Property Address: 4b Parkhill Road

Address : 4b, Parkhill Road, LONDON, NW3 2YN

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Basement	44.69	(1a) x	2.55	(2a) =	113.96	(3a)
Ground floor	42.97	(1b) x	2.47	(2b) =	106.14	(3b)
First floor	42.97	(1c) x	2.65	(2c) =	113.87	(3c)
Second floor	42.97	(1d) x	2.85	(2d) =	122.46	(3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	173.6	(4)				
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =		456.43	(5)

2. Ventilation rate:

	main heating		secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

			Air changes per hour	
Infiltration due to chimneys, flues and fans =	(6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16)		0.15	(18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used			
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.13	(21)

Infiltration rate modified for monthly wind speed

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

DER WorkSheet: New dwelling design stage

Monthly average wind speed from Table 7

(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7

Wind Factor (22a)m = (22)m ÷ 4

(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 76.5 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.28	0.28	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.25	0.26	0.27	(25)

3. Heat losses and heat loss parameter:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			1.7	x	1	=	1.7			(26)
Windows Type 1			3.2	x1/[1/(0.7)+ 0.04]		=	2.18			(27)
Windows Type 2			0.51	x1/[1/(0.8)+ 0.04]		=	0.4			(27)
Windows Type 3			2.24	x1/[1/(0.8)+ 0.04]		=	1.74			(27)
Windows Type 4			0.51	x1/[1/(0.8)+ 0.04]		=	0.4			(27)
Windows Type 5			7.15	x1/[1/(0.7)+ 0.04]		=	4.87			(27)
Windows Type 6			0.46	x1/[1/(0.8)+ 0.04]		=	0.36			(27)
Windows Type 7			1.29	x1/[1/(0.8)+ 0.04]		=	1			(27)
Windows Type 8			0.46	x1/[1/(0.8)+ 0.04]		=	0.36			(27)
Windows Type 9			6.9	x1/[1/(0.7)+ 0.04]		=	4.7			(27)
Windows Type 10			0.39	x1/[1/(0.8)+ 0.04]		=	0.3			(27)
Windows Type 11			1.09	x1/[1/(0.8)+ 0.04]		=	0.84			(27)
Windows Type 12			0.39	x1/[1/(0.8)+ 0.04]		=	0.3			(27)
Windows Type 13			0.88	x1/[1/(0.8)+ 0.04]		=	0.68			(27)

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Windows Type 14			7.05	x1/[1/(0.7)+ 0.04] =		4.8			(27)
Rooflights Type 1			5.31	x1/[1/(0.8) + 0.04] =		4.248			(27b)
Rooflights Type 2			3.17	x1/[1/(0.8) + 0.04] =		2.536			(27b)
Floor Type 1			44.69	x	0.13	= 5.8097			(28)
Floor Type 2			15.78	x	0.13	= 2.0514			(28)
Walls Type1	86.28	0	86.28	x	0.18	= 15.53			(29)
Walls Type2	37.49	9.92	27.57	x	0.18	= 4.96			(29)
Walls Type3	38.69	24.3	14.39	x	0.18	= 2.59			(29)
Roof Type1	17.5	5.31	12.19	x	0.13	= 1.58			(30)
Roof Type2	42.97	3.17	39.8	x	0.13	= 5.17			(30)
Total area of elements, m²			283.4						(31)
Party wall			149.66	x	0	= 0			(32)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26) (30) + (32) = 68.9 (33)

Heat capacity Cm = S(A x k) ((28) (30) + (32) + (32a) (32e) = 17183.33 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 42.51 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = 111.41 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	42.18	41.7	41.22	38.82	38.34	35.94	35.94	35.46	36.9	38.34	39.3	40.26	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	153.59	153.11	152.63	150.23	149.75	147.35	147.35	146.87	148.31	149.75	150.71	151.67	

Average = Sum(39)$_{1\ 12}$ /12= 150.11 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	0.88	0.88	0.88	0.87	0.86	0.85	0.85	0.85	0.85	0.86	0.87	0.87	

Average = Sum(40)$_{1\ 12}$ /12= 0.86 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 2.97 (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 104.68 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(44)m=	115.14	110.96	106.77	102.58	98.39	94.21	94.21	98.39	102.58	106.77	110.96	115.14	

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

Total = Sum(44)$_{1\ 12}$ = 1256.1 (44)

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Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	170.75	149.34	154.11	134.35	128.92	111.24	103.08	118.29	119.7	139.5	152.28	165.37	
										Total = Sum(45)$_{1\ 12}$ =		1646.95	(45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	25.61	22.4	23.12	20.15	19.34	16.69	15.46	17.74	17.96	20.93	22.84	24.8	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel	210	(47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day):	0	(48)
Temperature factor from Table 2b	0	(49)
Energy lost from water storage, kWh/year (48) x (49) =	210	(50)
b) If manufacturer's declared cylinder loss factor is not known:		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0.01	(51)
If community heating see section 4.3		
Volume factor from Table 2a	0.83	(52)
Temperature factor from Table 2b	0.54	(53)
Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) =	1.28	(54)
Enter (50) or (54) in (55)	1.28	(55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	39.66	35.82	39.66	38.38	39.66	38.38	39.66	39.66	38.38	39.66	38.38	39.66	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	39.66	35.82	39.66	38.38	39.66	38.38	39.66	39.66	38.38	39.66	38.38	39.66	(57)

Primary circuit loss (annual) from Table 3	0	(58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	233.67	206.17	217.02	195.24	191.83	172.13	166	181.21	180.59	202.42	213.17	228.28	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	233.67	206.17	217.02	195.24	191.83	172.13	166	181.21	180.59	202.42	213.17	228.28	
										Output from water heater (annual)$_{1\ 12}$		2387.75	(64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	107.11	95.12	101.57	93.38	93.2	85.7	84.61	89.67	88.51	96.72	99.34	105.32	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

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

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(66)m=	148.37	148.37	148.37	148.37	148.37	148.37	148.37	148.37	148.37	148.37	148.37	148.37	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	30.82	27.37	22.26	16.85	12.6	10.64	11.49	14.94	20.05	25.46	29.71	31.67	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

(68)m=	345.2	348.79	339.76	320.54	296.28	273.48	258.25	254.67	263.7	282.91	307.17	329.97	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m=	37.84	37.84	37.84	37.84	37.84	37.84	37.84	37.84	37.84	37.84	37.84	37.84	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

Losses e.g. evaporation (negative values) (Table 5)

(71)m=	-118.69	-118.69	-118.69	-118.69	-118.69	-118.69	-118.69	-118.69	-118.69	-118.69	-118.69	-118.69	(71)

Water heating gains (Table 5)

(72)m=	143.96	141.55	136.53	129.7	125.27	119.03	113.72	120.52	122.93	130	137.98	141.56	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	590.5	588.21	569.05	537.6	504.66	473.66	453.98	460.64	477.19	508.88	545.37	573.71	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x 0.77	x	0.51	x	10.63	x	0.63	x	0.7	=	1.66	(74)
North	0.9x 0.77	x	0.46	x	10.63	x	0.63	x	0.7	=	1.49	(74)
North	0.9x 0.77	x	0.39	x	10.63	x	0.63	x	0.7	=	1.27	(74)
North	0.9x 0.77	x	0.51	x	20.32	x	0.63	x	0.7	=	3.17	(74)
North	0.9x 0.77	x	0.46	x	20.32	x	0.63	x	0.7	=	2.86	(74)
North	0.9x 0.77	x	0.39	x	20.32	x	0.63	x	0.7	=	2.42	(74)
North	0.9x 0.77	x	0.51	x	34.53	x	0.63	x	0.7	=	5.38	(74)
North	0.9x 0.77	x	0.46	x	34.53	x	0.63	x	0.7	=	4.85	(74)
North	0.9x 0.77	x	0.39	x	34.53	x	0.63	x	0.7	=	4.12	(74)
North	0.9x 0.77	x	0.51	x	55.46	x	0.63	x	0.7	=	8.64	(74)
North	0.9x 0.77	x	0.46	x	55.46	x	0.63	x	0.7	=	7.8	(74)
North	0.9x 0.77	x	0.39	x	55.46	x	0.63	x	0.7	=	6.61	(74)
North	0.9x 0.77	x	0.51	x	74.72	x	0.63	x	0.7	=	11.65	(74)
North	0.9x 0.77	x	0.46	x	74.72	x	0.63	x	0.7	=	10.5	(74)
North	0.9x 0.77	x	0.39	x	74.72	x	0.63	x	0.7	=	8.91	(74)
North	0.9x 0.77	x	0.51	x	79.99	x	0.63	x	0.7	=	12.47	(74)
North	0.9x 0.77	x	0.46	x	79.99	x	0.63	x	0.7	=	11.24	(74)
North	0.9x 0.77	x	0.39	x	79.99	x	0.63	x	0.7	=	9.53	(74)
North	0.9x 0.77	x	0.51	x	74.68	x	0.63	x	0.7	=	11.64	(74)
North	0.9x 0.77	x	0.46	x	74.68	x	0.63	x	0.7	=	10.5	(74)
North	0.9x 0.77	x	0.39	x	74.68	x	0.63	x	0.7	=	8.9	(74)

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North	0.9x	0.77	x	0.51	x	59.25	x	0.63	x	0.7	=	9.23	(74)
North	0.9x	0.77	x	0.46	x	59.25	x	0.63	x	0.7	=	8.33	(74)
North	0.9x	0.77	x	0.39	x	59.25	x	0.63	x	0.7	=	7.06	(74)
North	0.9x	0.77	x	0.51	x	41.52	x	0.63	x	0.7	=	6.47	(74)
North	0.9x	0.77	x	0.46	x	41.52	x	0.63	x	0.7	=	5.84	(74)
North	0.9x	0.77	x	0.39	x	41.52	x	0.63	x	0.7	=	4.95	(74)
North	0.9x	0.77	x	0.51	x	24.19	x	0.63	x	0.7	=	3.77	(74)
North	0.9x	0.77	x	0.46	x	24.19	x	0.63	x	0.7	=	3.4	(74)
North	0.9x	0.77	x	0.39	x	24.19	x	0.63	x	0.7	=	2.88	(74)
North	0.9x	0.77	x	0.51	x	13.12	x	0.63	x	0.7	=	2.04	(74)
North	0.9x	0.77	x	0.46	x	13.12	x	0.63	x	0.7	=	1.84	(74)
North	0.9x	0.77	x	0.39	x	13.12	x	0.63	x	0.7	=	1.56	(74)
North	0.9x	0.77	x	0.51	x	8.86	x	0.63	x	0.7	=	1.38	(74)
North	0.9x	0.77	x	0.46	x	8.86	x	0.63	x	0.7	=	1.25	(74)
North	0.9x	0.77	x	0.39	x	8.86	x	0.63	x	0.7	=	1.06	(74)
Southeast	0.9x	0.77	x	3.2	x	36.79	x	0.63	x	0.7	=	35.98	(77)
Southeast	0.9x	0.77	x	7.15	x	36.79	x	0.63	x	0.7	=	80.4	(77)
Southeast	0.9x	0.77	x	6.9	x	36.79	x	0.63	x	0.7	=	77.59	(77)
Southeast	0.9x	0.77	x	7.05	x	36.79	x	0.63	x	0.7	=	79.27	(77)
Southeast	0.9x	0.77	x	3.2	x	62.67	x	0.63	x	0.7	=	61.29	(77)
Southeast	0.9x	0.77	x	7.15	x	62.67	x	0.63	x	0.7	=	136.95	(77)
Southeast	0.9x	0.77	x	6.9	x	62.67	x	0.63	x	0.7	=	132.16	(77)
Southeast	0.9x	0.77	x	7.05	x	62.67	x	0.63	x	0.7	=	135.03	(77)
Southeast	0.9x	0.77	x	3.2	x	85.75	x	0.63	x	0.7	=	83.86	(77)
Southeast	0.9x	0.77	x	7.15	x	85.75	x	0.63	x	0.7	=	187.38	(77)
Southeast	0.9x	0.77	x	6.9	x	85.75	x	0.63	x	0.7	=	180.83	(77)
Southeast	0.9x	0.77	x	7.05	x	85.75	x	0.63	x	0.7	=	184.76	(77)
Southeast	0.9x	0.77	x	3.2	x	106.25	x	0.63	x	0.7	=	103.91	(77)
Southeast	0.9x	0.77	x	7.15	x	106.25	x	0.63	x	0.7	=	232.17	(77)
Southeast	0.9x	0.77	x	6.9	x	106.25	x	0.63	x	0.7	=	224.06	(77)
Southeast	0.9x	0.77	x	7.05	x	106.25	x	0.63	x	0.7	=	228.93	(77)
Southeast	0.9x	0.77	x	3.2	x	119.01	x	0.63	x	0.7	=	116.39	(77)
Southeast	0.9x	0.77	x	7.15	x	119.01	x	0.63	x	0.7	=	260.05	(77)
Southeast	0.9x	0.77	x	6.9	x	119.01	x	0.63	x	0.7	=	250.96	(77)
Southeast	0.9x	0.77	x	7.05	x	119.01	x	0.63	x	0.7	=	256.42	(77)
Southeast	0.9x	0.77	x	3.2	x	118.15	x	0.63	x	0.7	=	115.55	(77)
Southeast	0.9x	0.77	x	7.15	x	118.15	x	0.63	x	0.7	=	258.17	(77)
Southeast	0.9x	0.77	x	6.9	x	118.15	x	0.63	x	0.7	=	249.15	(77)
Southeast	0.9x	0.77	x	7.05	x	118.15	x	0.63	x	0.7	=	254.56	(77)
Southeast	0.9x	0.77	x	3.2	x	113.91	x	0.63	x	0.7	=	111.4	(77)
Southeast	0.9x	0.77	x	7.15	x	113.91	x	0.63	x	0.7	=	248.91	(77)

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Southeast	0.9x	0.77	x	6.9	x	113.91	x	0.63	x	0.7	=	240.2	(77)
Southeast	0.9x	0.77	x	7.05	x	113.91	x	0.63	x	0.7	=	245.43	(77)
Southeast	0.9x	0.77	x	3.2	x	104.39	x	0.63	x	0.7	=	102.09	(77)
Southeast	0.9x	0.77	x	7.15	x	104.39	x	0.63	x	0.7	=	228.11	(77)
Southeast	0.9x	0.77	x	6.9	x	104.39	x	0.63	x	0.7	=	220.13	(77)
Southeast	0.9x	0.77	x	7.05	x	104.39	x	0.63	x	0.7	=	224.92	(77)
Southeast	0.9x	0.77	x	3.2	x	92.85	x	0.63	x	0.7	=	90.81	(77)
Southeast	0.9x	0.77	x	7.15	x	92.85	x	0.63	x	0.7	=	202.89	(77)
Southeast	0.9x	0.77	x	6.9	x	92.85	x	0.63	x	0.7	=	195.8	(77)
Southeast	0.9x	0.77	x	7.05	x	92.85	x	0.63	x	0.7	=	200.06	(77)
Southeast	0.9x	0.77	x	3.2	x	69.27	x	0.63	x	0.7	=	67.74	(77)
Southeast	0.9x	0.77	x	7.15	x	69.27	x	0.63	x	0.7	=	151.36	(77)
Southeast	0.9x	0.77	x	6.9	x	69.27	x	0.63	x	0.7	=	146.07	(77)
Southeast	0.9x	0.77	x	7.05	x	69.27	x	0.63	x	0.7	=	149.24	(77)
Southeast	0.9x	0.77	x	3.2	x	44.07	x	0.63	x	0.7	=	43.1	(77)
Southeast	0.9x	0.77	x	7.15	x	44.07	x	0.63	x	0.7	=	96.3	(77)
Southeast	0.9x	0.77	x	6.9	x	44.07	x	0.63	x	0.7	=	92.93	(77)
Southeast	0.9x	0.77	x	7.05	x	44.07	x	0.63	x	0.7	=	94.95	(77)
Southeast	0.9x	0.77	x	3.2	x	31.49	x	0.63	x	0.7	=	30.79	(77)
Southeast	0.9x	0.77	x	7.15	x	31.49	x	0.63	x	0.7	=	68.81	(77)
Southeast	0.9x	0.77	x	6.9	x	31.49	x	0.63	x	0.7	=	66.4	(77)
Southeast	0.9x	0.77	x	7.05	x	31.49	x	0.63	x	0.7	=	67.84	(77)
West	0.9x	0.77	x	0.51	x	19.64	x	0.63	x	0.7	=	3.06	(80)
West	0.9x	0.77	x	0.46	x	19.64	x	0.63	x	0.7	=	2.76	(80)
West	0.9x	0.77	x	0.39	x	19.64	x	0.63	x	0.7	=	2.34	(80)
West	0.9x	0.77	x	0.51	x	38.42	x	0.63	x	0.7	=	5.99	(80)
West	0.9x	0.77	x	0.46	x	38.42	x	0.63	x	0.7	=	5.4	(80)
West	0.9x	0.77	x	0.39	x	38.42	x	0.63	x	0.7	=	4.58	(80)
West	0.9x	0.77	x	0.51	x	63.27	x	0.63	x	0.7	=	9.86	(80)
West	0.9x	0.77	x	0.46	x	63.27	x	0.63	x	0.7	=	8.9	(80)
West	0.9x	0.77	x	0.39	x	63.27	x	0.63	x	0.7	=	7.54	(80)
West	0.9x	0.77	x	0.51	x	92.28	x	0.63	x	0.7	=	14.38	(80)
West	0.9x	0.77	x	0.46	x	92.28	x	0.63	x	0.7	=	12.97	(80)
West	0.9x	0.77	x	0.39	x	92.28	x	0.63	x	0.7	=	11	(80)
West	0.9x	0.77	x	0.51	x	113.09	x	0.63	x	0.7	=	17.63	(80)
West	0.9x	0.77	x	0.46	x	113.09	x	0.63	x	0.7	=	15.9	(80)
West	0.9x	0.77	x	0.39	x	113.09	x	0.63	x	0.7	=	13.48	(80)
West	0.9x	0.77	x	0.51	x	115.77	x	0.63	x	0.7	=	18.04	(80)
West	0.9x	0.77	x	0.46	x	115.77	x	0.63	x	0.7	=	16.28	(80)
West	0.9x	0.77	x	0.39	x	115.77	x	0.63	x	0.7	=	13.8	(80)
West	0.9x	0.77	x	0.51	x	110.22	x	0.63	x	0.7	=	17.18	(80)

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West	0.9x	0.77	x	0.46	x	110.22	x	0.63	x	0.7	=	15.49	(80)
West	0.9x	0.77	x	0.39	x	110.22	x	0.63	x	0.7	=	13.14	(80)
West	0.9x	0.77	x	0.51	x	94.68	x	0.63	x	0.7	=	14.76	(80)
West	0.9x	0.77	x	0.46	x	94.68	x	0.63	x	0.7	=	13.31	(80)
West	0.9x	0.77	x	0.39	x	94.68	x	0.63	x	0.7	=	11.28	(80)
West	0.9x	0.77	x	0.51	x	73.59	x	0.63	x	0.7	=	11.47	(80)
West	0.9x	0.77	x	0.46	x	73.59	x	0.63	x	0.7	=	10.35	(80)
West	0.9x	0.77	x	0.39	x	73.59	x	0.63	x	0.7	=	8.77	(80)
West	0.9x	0.77	x	0.51	x	45.59	x	0.63	x	0.7	=	7.11	(80)
West	0.9x	0.77	x	0.46	x	45.59	x	0.63	x	0.7	=	6.41	(80)
West	0.9x	0.77	x	0.39	x	45.59	x	0.63	x	0.7	=	5.43	(80)
West	0.9x	0.77	x	0.51	x	24.49	x	0.63	x	0.7	=	3.82	(80)
West	0.9x	0.77	x	0.46	x	24.49	x	0.63	x	0.7	=	3.44	(80)
West	0.9x	0.77	x	0.39	x	24.49	x	0.63	x	0.7	=	2.92	(80)
West	0.9x	0.77	x	0.51	x	16.15	x	0.63	x	0.7	=	2.52	(80)
West	0.9x	0.77	x	0.46	x	16.15	x	0.63	x	0.7	=	2.27	(80)
West	0.9x	0.77	x	0.39	x	16.15	x	0.63	x	0.7	=	1.93	(80)
Northwest	0.9x	0.77	x	2.24	x	11.28	x	0.63	x	0.7	=	7.72	(81)
Northwest	0.9x	0.77	x	1.29	x	11.28	x	0.7	x	0.63	=	4.45	(81)
Northwest	0.9x	0.77	x	1.09	x	11.28	x	0.63	x	0.7	=	3.76	(81)
Northwest	0.9x	0.77	x	0.88	x	11.28	x	0.63	x	0.7	=	3.03	(81)
Northwest	0.9x	0.77	x	2.24	x	22.97	x	0.63	x	0.7	=	15.72	(81)
Northwest	0.9x	0.77	x	1.29	x	22.97	x	0.7	x	0.63	=	9.05	(81)
Northwest	0.9x	0.77	x	1.09	x	22.97	x	0.63	x	0.7	=	7.65	(81)
Northwest	0.9x	0.77	x	0.88	x	22.97	x	0.63	x	0.7	=	6.18	(81)
Northwest	0.9x	0.77	x	2.24	x	41.38	x	0.63	x	0.7	=	28.33	(81)
Northwest	0.9x	0.77	x	1.29	x	41.38	x	0.7	x	0.63	=	16.31	(81)
Northwest	0.9x	0.77	x	1.09	x	41.38	x	0.63	x	0.7	=	13.78	(81)
Northwest	0.9x	0.77	x	0.88	x	41.38	x	0.63	x	0.7	=	11.13	(81)
Northwest	0.9x	0.77	x	2.24	x	67.96	x	0.63	x	0.7	=	46.52	(81)
Northwest	0.9x	0.77	x	1.29	x	67.96	x	0.7	x	0.63	=	26.79	(81)
Northwest	0.9x	0.77	x	1.09	x	67.96	x	0.63	x	0.7	=	22.64	(81)
Northwest	0.9x	0.77	x	0.88	x	67.96	x	0.63	x	0.7	=	18.28	(81)
Northwest	0.9x	0.77	x	2.24	x	91.35	x	0.63	x	0.7	=	62.53	(81)
Northwest	0.9x	0.77	x	1.29	x	91.35	x	0.7	x	0.63	=	36.01	(81)
Northwest	0.9x	0.77	x	1.09	x	91.35	x	0.63	x	0.7	=	30.43	(81)
Northwest	0.9x	0.77	x	0.88	x	91.35	x	0.63	x	0.7	=	24.57	(81)
Northwest	0.9x	0.77	x	2.24	x	97.38	x	0.63	x	0.7	=	66.67	(81)
Northwest	0.9x	0.77	x	1.29	x	97.38	x	0.7	x	0.63	=	38.39	(81)
Northwest	0.9x	0.77	x	1.09	x	97.38	x	0.63	x	0.7	=	32.44	(81)
Northwest	0.9x	0.77	x	0.88	x	97.38	x	0.63	x	0.7	=	26.19	(81)

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Northwest	0.9x	0.77	x	2.24	x	91.1	x	0.63	x	0.7	=	62.37	(81)
Northwest	0.9x	0.77	x	1.29	x	91.1	x	0.7	x	0.63	=	35.92	(81)
Northwest	0.9x	0.77	x	1.09	x	91.1	x	0.63	x	0.7	=	30.35	(81)
Northwest	0.9x	0.77	x	0.88	x	91.1	x	0.63	x	0.7	=	24.5	(81)
Northwest	0.9x	0.77	x	2.24	x	72.63	x	0.63	x	0.7	=	49.72	(81)
Northwest	0.9x	0.77	x	1.29	x	72.63	x	0.7	x	0.63	=	28.63	(81)
Northwest	0.9x	0.77	x	1.09	x	72.63	x	0.63	x	0.7	=	24.19	(81)
Northwest	0.9x	0.77	x	0.88	x	72.63	x	0.63	x	0.7	=	19.53	(81)
Northwest	0.9x	0.77	x	2.24	x	50.42	x	0.63	x	0.7	=	34.52	(81)
Northwest	0.9x	0.77	x	1.29	x	50.42	x	0.7	x	0.63	=	19.88	(81)
Northwest	0.9x	0.77	x	1.09	x	50.42	x	0.63	x	0.7	=	16.8	(81)
Northwest	0.9x	0.77	x	0.88	x	50.42	x	0.63	x	0.7	=	13.56	(81)
Northwest	0.9x	0.77	x	2.24	x	28.07	x	0.63	x	0.7	=	19.21	(81)
Northwest	0.9x	0.77	x	1.29	x	28.07	x	0.7	x	0.63	=	11.07	(81)
Northwest	0.9x	0.77	x	1.09	x	28.07	x	0.63	x	0.7	=	9.35	(81)
Northwest	0.9x	0.77	x	0.88	x	28.07	x	0.63	x	0.7	=	7.55	(81)
Northwest	0.9x	0.77	x	2.24	x	14.2	x	0.63	x	0.7	=	9.72	(81)
Northwest	0.9x	0.77	x	1.29	x	14.2	x	0.7	x	0.63	=	5.6	(81)
Northwest	0.9x	0.77	x	1.09	x	14.2	x	0.63	x	0.7	=	4.73	(81)
Northwest	0.9x	0.77	x	0.88	x	14.2	x	0.63	x	0.7	=	3.82	(81)
Northwest	0.9x	0.77	x	2.24	x	9.21	x	0.63	x	0.7	=	6.31	(81)
Northwest	0.9x	0.77	x	1.29	x	9.21	x	0.7	x	0.63	=	3.63	(81)
Northwest	0.9x	0.77	x	1.09	x	9.21	x	0.63	x	0.7	=	3.07	(81)
Northwest	0.9x	0.77	x	0.88	x	9.21	x	0.63	x	0.7	=	2.48	(81)
Rooflights	0.9x	1	x	5.31	x	26	x	0.63	x	0.7	=	54.8	(82)
Rooflights	0.9x	1	x	3.17	x	26	x	0.63	x	0.7	=	32.71	(82)
Rooflights	0.9x	1	x	5.31	x	54	x	0.63	x	0.7	=	113.81	(82)
Rooflights	0.9x	1	x	3.17	x	54	x	0.63	x	0.7	=	67.94	(82)
Rooflights	0.9x	1	x	5.31	x	96	x	0.63	x	0.7	=	202.32	(82)
Rooflights	0.9x	1	x	3.17	x	96	x	0.63	x	0.7	=	120.78	(82)
Rooflights	0.9x	1	x	5.31	x	150	x	0.63	x	0.7	=	316.13	(82)
Rooflights	0.9x	1	x	3.17	x	150	x	0.63	x	0.7	=	188.73	(82)
Rooflights	0.9x	1	x	5.31	x	192	x	0.63	x	0.7	=	404.65	(82)
Rooflights	0.9x	1	x	3.17	x	192	x	0.63	x	0.7	=	241.57	(82)
Rooflights	0.9x	1	x	5.31	x	200	x	0.63	x	0.7	=	421.51	(82)
Rooflights	0.9x	1	x	3.17	x	200	x	0.63	x	0.7	=	251.63	(82)
Rooflights	0.9x	1	x	5.31	x	189	x	0.63	x	0.7	=	398.32	(82)
Rooflights	0.9x	1	x	3.17	x	189	x	0.63	x	0.7	=	237.79	(82)
Rooflights	0.9x	1	x	5.31	x	157	x	0.63	x	0.7	=	330.88	(82)
Rooflights	0.9x	1	x	3.17	x	157	x	0.63	x	0.7	=	197.53	(82)
Rooflights	0.9x	1	x	5.31	x	115	x	0.63	x	0.7	=	242.37	(82)

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Rooflights 0.9x	1	x	3.17	x	115	x	0.63	x	0.7	=	144.69	(82)
Rooflights 0.9x	1	x	5.31	x	66	x	0.63	x	0.7	=	139.1	(82)
Rooflights 0.9x	1	x	3.17	x	66	x	0.63	x	0.7	=	83.04	(82)
Rooflights 0.9x	1	x	5.31	x	33	x	0.63	x	0.7	=	69.55	(82)
Rooflights 0.9x	1	x	3.17	x	33	x	0.63	x	0.7	=	41.52	(82)
Rooflights 0.9x	1	x	5.31	x	21	x	0.63	x	0.7	=	44.26	(82)
Rooflights 0.9x	1	x	3.17	x	21	x	0.63	x	0.7	=	26.42	(82)

Solar gains in watts, calculated for each month (83)m = Sum(74)m (82)m

(83)m=	392.3	710.21	1070.14	1469.56	1761.64	1795.62	1712.03	1489.71	1209.2	812.73	477.85	330.41	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	982.8	1298.42	1639.2	2007.16	2266.3	2269.28	2166.01	1950.35	1686.4	1321.61	1023.22	904.12	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	1	0.99	0.96	0.82	0.6	0.41	0.3	0.35	0.6	0.92	0.99	1	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.28	20.45	20.68	20.88	20.95	20.96	20.96	20.96	20.95	20.81	20.5	20.25	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.18	20.18	20.19	20.2	20.2	20.21	20.21	20.21	20.21	20.2	20.19	20.19	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	1	0.99	0.94	0.78	0.56	0.36	0.25	0.29	0.53	0.9	0.99	1	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.21	19.46	19.78	20.05	20.13	20.15	20.15	20.15	20.14	19.98	19.53	19.17	(90)

fLA = Living area ÷ (4) = 0.12 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.34	19.58	19.89	20.15	20.23	20.25	20.25	20.25	20.24	20.08	19.65	19.31	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.19	19.43	19.74	20	20.08	20.1	20.1	20.1	20.09	19.93	19.5	19.16	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

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

Utilisation factor for gains, hm:

(94)m=	1	0.99	0.93	0.77	0.55	0.36	0.24	0.28	0.52	0.89	0.99	1	(94)

Useful gains, hmGm , W = (94)m x (84)m

(95)m=	979.89	1279.35	1532.5	1551.12	1241.32	809.3	515.31	543.27	881.14	1172.36	1012.88	902.46	(95)

Monthly average external temperature from Table 8

(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]

(97)m=	2286.38	2224.65	2020.99	1668.24	1254.46	809.97	515.35	543.37	888.05	1397.23	1868.58	2268.23	(97)

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	972.03	635.24	363.44	84.33	9.77	0	0	0	0	167.3	616.1	1016.13	

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Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ =	3864.35	(98)
Space heating requirement in kWh/m²/year	22.26	(99)

9a. Energy requirements – Individual heating systems including micro-CHP)

Space heating:

Fraction of space heat from secondary/supplementary system	0	(201)
Fraction of space heat from main system(s) (202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1 (204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1	94	(206)
Efficiency of secondary/supplementary heating system, %	0	(208)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)												
972.03	635.24	363.44	84.33	9.77	0	0	0	0	167.3	616.1	1016.13	
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)												(211)
1034.08	675.79	386.64	89.71	10.4	0	0	0	0	177.98	655.43	1080.99	

Total (kWh/year) =Sum(211)$_{1...5,10...12}$=	4111.01	(211)

Space heating fuel (secondary), kWh/month
= {[(98)m x (201)] + (214) m } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0	

Total (kWh/year) =Sum(215)$_{1...5,10...12}$=	0	(215)

Water heating

Output from water heater (calculated above)

233.67	206.17	217.02	195.24	191.83	172.13	166	181.21	180.59	202.42	213.17	228.28	

Efficiency of water heater	80.3	(216)

(217)m=	88.71	88.12	86.68	83.25	80.76	80.3	80.3	80.3	80.3	84.81	87.99	88.83	(217)

Fuel for water heating, kWh/month
(219)m = (64)m x 100 ÷ (217)m

(219)m=	263.41	233.96	250.37	234.52	237.54	214.36	206.73	225.67	224.9	238.67	242.27	256.99	

Total = Sum(219a)$_{1...12}$ =	2829.38	(219)

Annual totals	**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1		4111.01	
Water heating fuel used		2829.38	
Electricity for pumps, fans and electric keep-hot			
mechanical ventilation - balanced, extract or positive input from outside	311.83		(230a)
central heating pump:	30		(230c)
boiler with a fan-assisted flue	45		(230e)
Total electricity for the above, kWh/year sum of (230a) (230g) =		386.83	(231)
Electricity for lighting		544.24	(232)
Electricity generated by PVs		-950.62	(233)

12a. CO2 emissions – Individual heating systems including micro-CHP

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	Energy kWh/year		Emission factor kg CO2/kWh		Emissions kg CO2/year	
Space heating (main system 1)	(211) x		0.216	=	887.98	(261)
Space heating (secondary)	(215) x		0.519	=	0	(263)
Water heating	(219) x		0.216	=	611.15	(264)
Space and water heating	(261) + (262) + (263) + (264) =				1499.12	(265)
Electricity for pumps, fans and electric keep-hot	(231) x		0.519	=	200.77	(267)
Electricity for lighting	(232) x		0.519	=	282.46	(268)
Energy saving/generation technologies Item 1			0.519	=	-493.37	(269)
Total CO2, kg/year		sum of (265) (271) =			1488.98	(272)
Dwelling CO2 Emission Rate		(272) ÷ (4) =			8.58	(273)
EI rating (section 14)					91	(274)