

Appendix 6: Energy Efficiency

Provided by Robin Ashley Architects LLP

The Code for Sustainable Homes uses the same methodology as the Building Regulations to establish energy efficiency; the Standard Assessment Procedure or SAP, version 2012.

SAP takes into account the following:

- Floor area of the dwelling
- The heat loss of the opaque building fabric
- The heat loss of openings
- Air infiltration
- Ventilation systems
- The efficiency and Carbon utilisation of the hot water and heating systems(s)
- Any renewable systems
- Efficiency of lighting

SAP does not assess the energy efficiency of white goods.

It produces figures for relative Carbon use, (ENE1 in CfSH) and relative thermal performance, (ENE2).

Subject to detailed design to achieve the scores above in these sections the following measures will be utilized:

Insulation:

Walls: nom 150mm insulation in cavity masonry construction.

Exposed ground floor: nom 150mm expanded polystyrene insulation on concrete slab below screed and finishes.

Roof: nom 150mm rigid urethane insulation above roof rafters for roof and mansard.

Glazed openings: Double glazed with soft low emissivity coating, argon fill and warm edge spacer with thermally broken frames. Triple

glazed and solar control for more heavily glazed units.

Target airtightness: 3m³/(m².hr) at 50 Pa

Natural ventilation

Combination gas boiler >90% efficiency

Approx. 10% renewables contribution via PV panels for 50% units if required

100% low energy / energy efficient light fittings.

Owing to certain anachronisms of the SAP process, some units perform worse than others, despite adopting the same measures. For this reason correct CfSH assessment methodology takes these values as an average for the building, however the SAP worksheets generated as below consider individual units.

Unit 1-03

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Assessor and House Details

Assessor Name: Assessor Number:
Property Address:
Building regulation assessment

	kg/m ² /year
TER	19.25
DER	17.99

ENE 1 Assessment - Dwelling Emission Rate

Total Energy Type CO₂ Emissions for Codes Levels 1 - 5

	%	kg/m ² /year	
DER from SAP 2012 DER Worksheet		17.99	(ZC1)
TER		19.25	
Residual CO ₂ emissions offset from biofuel CHP		0	(ZC5)
CO ₂ emissions offset from additional allowable electricity generation		0	(ZC7)
Total CO ₂ emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		17.99	
% improvement DER/TER	6.5		

Total Energy Type CO₂ Emissions for Codes Levels 6

	kg/m ² /year	
DER accounting for SAP Section 16 allowances	17.99	(ZC1)
CO ₂ emissions from appliances, equation (L14)	18.06	(ZC2)
CO ₂ emissions from cooking, equation (L16)	3.94	(ZC3)
Net CO ₂ emissions	43.1	(ZC8)

Result:

Credits awarded for ENE 1 = 1

Code Level = 3

ENE 2 - Fabric energy Efficiency

Fabric energy Efficiency: 39.11

Credits awarded for ENE 2 = 6.9

ENE 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO₂ Emissions

	%	kg/m ² /year	
Standard Case CO ₂ emissions		41.23	
Standard DER		19.48	
Actual Case CO ₂ emissions		41.23	
Actual DER		19.48	
Reduction in CO ₂ emissions	0		

Credits awarded for ENE 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kW_e or 300kW_{th} must be certified.
- Combined Heat and Power (CHP) schemes above 50kW_e must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kW_e they must be certified under the CHPQA.

It is the responsibility of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Unit 1-04

Code for Sustainable Homes Report For use with Nov 2010 addendum 2014 England

Assessor and House Details

Assessor Name:

Assessor Number:

Property Address:

Building regulation assessment

	kg/m ² /year
TER	20.5
DER	19.35

ENE 1 Assessment - Dwelling Emission Rate

Total Energy Type CO₂ Emissions for Codes Levels 1 - 5

	%	kg/m ² /year	
DER from SAP 2012 DER Worksheet		19.35	(ZC1)
TER		20.5	
Residual CO ₂ emissions offset from biofuel CHP		0	(ZC5)
CO ₂ emissions offset from additional allowable electricity generation		0	(ZC7)
Total CO ₂ emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		19.35	
% improvement DER/TER	5.6		

Total Energy Type CO₂ Emissions for Codes Levels 6

	kg/m ² /year	
DER accounting for SAP Section 16 allowances	19.35	(ZC1)
CO ₂ emissions from appliances, equation (L14)	18.02	(ZC2)
CO ₂ emissions from cooking, equation (L16)	3.9	(ZC3)
Net CO ₂ emissions	43	(ZC8)

Result:

Credits awarded for ENE 1 = 0.9

Code Level = 3

ENE 2 - Fabric energy Efficiency

Fabric energy Efficiency: 41.61

Credits awarded for ENE 2 = 5.7

ENE 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO₂ Emissions

	%	kg/m ² /year	
Standard Case CO ₂ emissions		43.13	
Standard DER		21.13	
Actual Case CO ₂ emissions		43.13	
Actual DER		21.13	
Reduction in CO ₂ emissions	0		

Credits awarded for ENE 7 = 0

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CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kW_e they must be certified under the CHPQA.

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Unit 1-05

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Assessor and House Details

Assessor Name:
Property Address:

Assessor Number:

Building regulation assessment

	kg/m ² /year
TER	20.45
DER	19.3

ENE 1 Assessment - Dwelling Emission Rate

Total Energy Type CO₂ Emissions for Codes Levels 1 - 5

	%	kg/m ² /year	
DER from SAP 2012 DER Worksheet		19.3	(ZC1)
TER		20.45	
Residual CO ₂ emissions offset from biofuel CHP		0	(ZC5)
CO ₂ emissions offset from additional allowable electricity generation		0	(ZC7)
Total CO ₂ emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		19.3	
% improvement DER/TER	5.6		

Total Energy Type CO₂ Emissions for Codes Levels 6

	kg/m ² /year	
DER accounting for SAP Section 16 allowances	19.3	(ZC1)
CO ₂ emissions from appliances, equation (L14)	16.83	(ZC2)
CO ₂ emissions from cooking, equation (L16)	2.61	(ZC3)
Net CO ₂ emissions	36	(ZC8)

Result:

Credits awarded for ENE 1 = 0.9

Code Level = 3

ENE 2 - Fabric energy Efficiency

Fabric energy Efficiency: 42.54

Credits awarded for ENE 2 = 5.2

ENE 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO₂ Emissions

	%	kg/m ² /year	
Standard Case CO ₂ emissions		43.05	
Standard DER		21.13	
Actual Case CO ₂ emissions		43.05	
Actual DER		21.13	
Reduction in CO ₂ emissions	0		

Credits awarded for ENE 7 = 0

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- Combined Heat and Power (CHP) schemes above 50kW_e must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kW_e they must be certified under the CHPQA.

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Unit 2-02

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Assessor and House Details

Assessor Name: **Assessor Number:**
Property Address:
Building regulation assessment

	kg/m²/year
TER	16.92
DER	15.74

ENE 1 Assessment - Dwelling Emission Rate

Total Energy Type CO₂ Emissions for Codes Levels 1 - 5

	%	kg/m ² /year	
DER from SAP 2012 DER Worksheet		15.74	(ZC1)
TER		16.92	
Residual CO ₂ emissions offset from biofuel CHP		0	(ZC5)
CO ₂ emissions offset from additional allowable electricity generation		0	(ZC7)
Total CO ₂ emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		15.74	
% improvement DER/TER	7		

Total Energy Type CO₂ Emissions for Codes Levels 6

	kg/m ² /year	
DER accounting for SAP Section 16 allowances	15.74	(ZC1)
CO ₂ emissions from appliances, equation (L14)	16.83	(ZC2)
CO ₂ emissions from cooking, equation (L16)	2.61	(ZC3)
Net CO ₂ emissions	36	(ZC8)

Result:

Credits awarded for ENE 1 = 1.1

Code Level = 3

ENE 2 - Fabric energy Efficiency

Fabric energy Efficiency: 37.36

Credits awarded for ENE 2 = 7.4

ENE 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO₂ Emissions

	%	kg/m ² /year	
Standard Case CO ₂ emissions		35.99	
Standard DER		16.54	
Actual Case CO ₂ emissions		35.99	
Actual DER		16.54	
Reduction in CO ₂ emissions	0		

Credits awarded for ENE 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

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- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kW_e or 300kW_{th} must be certified.
- Combined Heat and Power (CHP) schemes above 50kW_e must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kW_e they must be certified under the CHPQA.

It is the responsibility of the Accredited ODEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.

Unit 3-02

Code for Sustainable Homes Report For use with Nov 2010 addendum 2014 England

Assessor and House Details

Assessor Name:

Assessor Number:

Property Address:

Building regulation assessment

	kg/m ² /year
TER	18.2
DER	15.7

ENE 1 Assessment - Dwelling Emission Rate

Total Energy Type CO₂ Emissions for Codes Levels 1 - 5

	%	kg/m ² /year	
DER from SAP 2012 DER Worksheet		15.7	(ZC1)
TER		18.2	
Residual CO ₂ emissions offset from biofuel CHP		0	(ZC5)
CO ₂ emissions offset from additional allowable electricity generation		0	(ZC7)
Total CO ₂ emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		15.7	
% improvement DER/TER	13.7		

Total Energy Type CO₂ Emissions for Codes Levels 6

	kg/m ² /year	
DER accounting for SAP Section 16 allowances	15.7	(ZC1)
CO ₂ emissions from appliances, equation (L14)	18.54	(ZC2)
CO ₂ emissions from cooking, equation (L16)	4.39	(ZC3)
Net CO ₂ emissions	49.5	(ZC8)

Result:

Credits awarded for ENE 1 = 2.2

Code Level = 3

ENE 2 - Fabric energy Efficiency

Fabric energy Efficiency: 37.18

Credits awarded for ENE 2 = 7.5

ENE 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO₂ Emissions

	%	kg/m ² /year	
Standard Case CO ₂ emissions		35.95	
Standard DER		16.5	
Actual Case CO ₂ emissions		35.95	
Actual DER		16.5	
Reduction in CO ₂ emissions	0		

Credits awarded for ENE 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kW_e they must be certified under the CHPQA.

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Unit 4-02

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Assessor and House Details

Assessor Name:

Assessor Number:

Property Address:

Building regulation assessment

	kg/m²/year
TER	25.45
DER	24.69

ENE 1 Assessment - Dwelling Emission Rate

Total Energy Type CO₂ Emissions for Codes Levels 1 - 5

	%	kg/m ² /year	
DER from SAP 2012 DER Worksheet		24.69	(ZC1)
TER		25.45	
Residual CO ₂ emissions offset from biofuel CHP		0	(ZC5)
CO ₂ emissions offset from additional allowable electricity generation		0	(ZC7)
Total CO ₂ emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		24.69	
% improvement DER/TER	3		

Total Energy Type CO₂ Emissions for Codes Levels 6

	kg/m ² /year	
DER accounting for SAP Section 16 allowances	24.69	(ZC1)
CO ₂ emissions from appliances, equation (L14)	17.94	(ZC2)
CO ₂ emissions from cooking, equation (L16)	3.82	(ZC3)
Net CO ₂ emissions	40.4	(ZC8)

Result:

Credits awarded for ENE 1 = 0.5

Code Level = 3

ENE 2 - Fabric energy Efficiency

Fabric energy Efficiency: 61.58

Credits awarded for ENE 2 = 0

ENE 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO₂ Emissions

	%	kg/m ² /year	
Standard Case CO ₂ emissions		49.51	
Standard DER		26.58	
Actual Case CO ₂ emissions		49.51	
Actual DER		26.58	
Reduction in CO ₂ emissions	0		

Credits awarded for ENE 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

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