

BREEAM UK NC 2018 Ene 01 Calculation Methodology

The purpose of this guidance note is to describe the calculation methodology for energy performance under the Ene 01 issue of the BREEAM UK New Construction 2018 scheme.

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Introduction

The calculation methodology for determining the number of credits achieved for energy performance under the Ene 01 assessment issue for BREEAM UK New Construction 2014 scheme has been revised for the BREEAM UK New Construction 2018 scheme. The methodology is based on compliance modelling and uses a triple metric approach that addresses energy demand, energy consumption and CO₂ emissions. The aim of using this approach is to enhance the ability of BREEAM to recognise and promote designs that minimise energy demand and consumption in buildings and then to reduce the carbon emissions resulting from that energy use.

The triple metric approach

The methodology considers three parameters of the modelled performance of a new building when determining the number of credits achieved for this issue, as follows:

- Heating and cooling energy demand.
- Primary energy consumption.
- Carbon dioxide (CO₂) emissions.

'Heating and cooling energy demand' is a measure of the annual heating and cooling energy demand, in MJ/m² year. It is influenced by factors including the building fabric performance and air permeability.

'Primary energy consumption' is a measure of the building's primary energy use in kWh/m² year. Primary energy means energy from renewable and non-renewable sources that has not undergone any conversion or transformation process. Primary energy differs from delivered energy in that, delivered energy is that consumed by the building, and reflects how efficiently a building meets its energy demand. For a conventional energy supply of gas and electricity, delivered energy is the sum of the gas and electricity use, as read at the building's meters. Delivered energy consumption is also known as operational energy consumption. Primary energy is transformed by the means of energy generation used and transmitted to the building. When it arrives at the building, it is delivered energy. Primary energy is therefore influenced by both the efficiencies of any on-site building services systems and the efficiencies of energy generation and transmission from the power generators to the building.

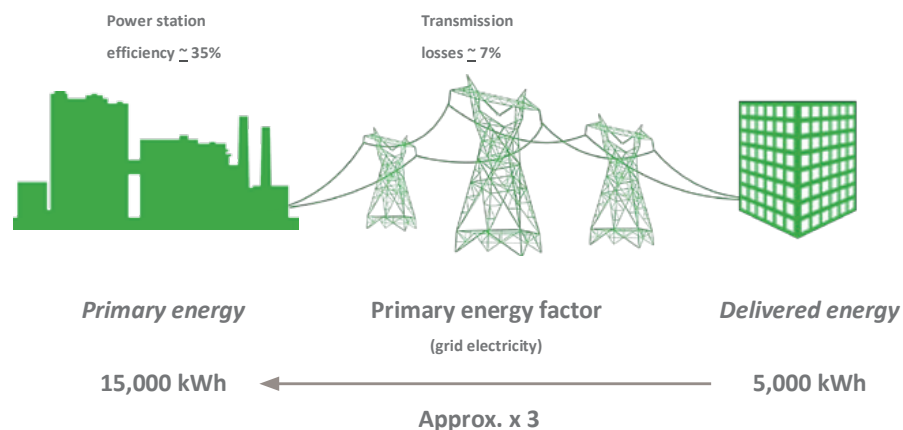


Figure 1 - Delivered energy and primary energy

The CO₂ emissions parameter is a measure of the carbon dioxide emissions the building emits in meeting its predicted energy demands for heating, cooling, ventilation and lighting, in kg CO₂ /m² year. It is influenced by factors including building fabric performance, systems and distribution efficiency and fuel source. The specification of low or zero carbon forms of energy generation (on-site or near-site low carbon or renewable energy) are accounted for in this parameter.

The triple metric approach ensures that standard practice against the energy efficiency or consumption scale cannot be offset by high performance on the carbon metric scale through the specification of low or zero carbon, on or offsite energy solutions. Therefore, BREEAM seeks to encourage and reward a holistic approach to reducing energy and emissions, through a balance of good building design and systems specification.

Standards for the countries of the UK

The four countries of the UK (Wales, Scotland, Northern Ireland and England) have different building regulation standards for energy. The BREEAM credits for energy performance under Ene 01 are based on the building regulations baseline and methodology, so the credits for this issue are now tailored to each UK country and use different numbers for the translation of energy performance into credits.

Using different baselines for different parts of the UK takes account of the divergence in country-specific energy regulations for new buildings across the UK and ensures that BREEAM reflects local building regulations. This means that any improvement over local regulations will now be reflected in the scoring.

A consequence of this approach is that it means there is a loss of comparability between buildings across the UK. Therefore, the number of credits awarded for a building in one country may be different to those for a building in another country with an identical design. This could lead to a building scoring an Excellent rating in Scotland and an identical building scoring a Very Good rating in England.

Relevant building regulation versions

The versions of the building regulations that are used to define the baseline in the 2018 version of the Ene 01 energy performance methodology for Northern Ireland, England, Wales and Scotland are as follows:

Northern Ireland: Technical Booklet F2 2012 Conservation of fuel and power in buildings other than dwellings

England: Approved Document Part L2A Conservation of fuel and power in new buildings other than dwellings, 2013 edition – for use in England.

Wales: Approved Document Part L2A Conservation of fuel and power: New buildings other than dwellings – for use in Wales.

Scotland: Technical Handbook 2015 Non Domestic, Section 6 Energy.

When entering building performance information into the BREEAM scoring and reporting tools, it is essential that the correct version of the building regulations is selected in the tool, and that the building performance information is generated by the correct version of the approved software.

Translating building performance into BREEAM credits

The procedure for translating modelled building performance in each of the above parameters into BREEAM credits is described in detail below. This includes a description of the BREEAM energy performance Ene 01 credits, benchmark scale and how this relates to building regulation compliance and achieving net zero carbon status.

The energy modelling data required to determine building performance is generated by National Calculation Method (NCM) compliant energy modelling software, used by the design team to demonstrate building regulation compliance. The NCM compliant energy modelling software produces a standard output document, called the BRUKL Output Document: Compliance with Building Regulations. The relevant energy modelling data from this document, described below, is then entered into the BREEAM Ene 01 calculator to determine the EPRNC and number of credits achieved.

The Target CO₂ Emission Rate (TER) is the minimum energy performance required by building regulations for a new building for all four countries of the UK. The TER is based on the performance of a notional building, which is defined in the NCM modelling guide for each country.

For Wales, Northern Ireland and England and Scotland, the TER is set to equal the CO₂ emissions from the notional building, as the notional building is concurrent with the compliant building regulations standards for these countries. The notional building is used to generate 'Indicative Targets' for demand and consumption as well as the TER for CO₂, as shown in the Energy & CO₂ Emissions Summary table in the BRUKL Output Document (see example below).

Energy & CO ₂ Emissions Summary		
	Actual	Indicative Target
Heating + cooling demand [MJ/m ²]	240.82	210.14
Total consumption [kWh/m ²]	99.82	101.07
Total emissions [kg/m ²]	44	44.4

Figure 2 - Extract from a BRUKL Output Document

Energy modelling input data required to translate building performance

The calculation is informed by the following performance data, sourced from the Energy & CO₂ Emissions Summary table in the BRUKL Output Document:

- Building floor area (m²)
- Notional building heating and cooling energy demand (MJ/m² yr)
- Actual building heating and cooling energy demand (MJ/m² yr)
- Notional building primary energy consumption (kWh/m² yr)
- Actual building primary energy consumption (kWh/m² yr)
- Target Emission Rate (TER) (kg CO₂ /m² yr)
- Building Emission Rate (BER) (kg CO₂ /m² yr)

Stage 1 - Defining the building's performance

The first stage of translating modelled building energy performance in to BREEAM credits is to calculate the 'building performance improvement'. This is done by comparing the actual performance of the modelled building design specification to the notional performance of the modelled building design specification as a proportion for each of the three parameters on an annual basis: heating and cooling energy demand; primary energy consumption; and CO₂ emissions.

$$\text{Building performance proportion} = \frac{\text{actual building performance (A)}}{\text{notional building performance (N)}} \quad \text{for each parameter}$$

$$\text{Building demand performance improvement} = A/N \text{ demand}$$

$$\text{Building primary consumption performance improvement} = A/N \text{ primary consumption}$$

$$\text{Building CO}_2 \text{ performance improvement} = BER/TER$$

Stage 2 - Benchmarking the performance improvement against the modelled building stock

Each of the percentages from stage 1 is then 'translated' into an Energy Performance Ratio (EPR) for each parameter expressed as a value. See below for a detailed description of how the translators are derived and building performance is benchmarked.

To achieve an Energy Performance Ratio of less than one for any of the three parameters, the building's performance must be better than the level achieved for the same parameter by the notional building specification.

Stage 3 - Weighting the individual ratios for each parameter

The Energy Performance Ratios for each parameter from stage 2 are then multiplied by weightings.

These weightings reflect the maximum that each parameter can contribute towards the overall Energy Performance Ratio, EPR_{NC} , and therefore BREEAM credits. BREEAM UK New Construction 2018 uses a weighting factor in the stage 3 calculation to reflect equal importance of the three energy metrics:

$$\text{Weighted } EPR_{dem} = \text{Building energy heating and cooling demand weighting} \times \text{unweighted } EPR_{dem}$$

$$\text{Weighted } EPR_{PC} = \text{Primary energy consumption weighting} \times \text{unweighted } EPR_{PC}$$

$$\text{Weighted } EPR_{CO2} = \text{CO}_2 \text{ weighting} \times \text{unweighted } EPR_{CO2}$$

Note: Different weightings are used for buildings/ building areas assessed using the domestic assessment method, e.g. Standard Assessment Procedure (SAP), i.e. residential areas. Please refer to the Methodology section of the Energy 01 issue for guidance on calculating the Ene 01 performance of buildings with residential areas modelled using the domestic assessment method.

Stage 4 - Awarding the BREEAM credits

The weighted Energy Performance Ratios for each parameter from stage 3 are totalled to give an overall Energy Performance Ratio for New Construction, EPR_{NC} . This is then compared to the table of benchmarks to determine the number of BREEAM credits awarded. See the Ene 01 issue for the BREEAM credits benchmark scale and its relation to the building regulations compliant standard for each nation and BREEAM's minimum standards.

$$EPR_{dem} + EPR_{PC} + EPR_{CO2} = EPR_{NC}$$

A completed example of this calculation procedure is provided on the following pages.

Defining the BREEAM translators

The translator of performance for each of the three parameters is derived from performance modelling of a stock of actual buildings, which represent different building types, using an NCM compliant software package.

Although minimum energy performance standards for compliance with Part L2a of the Building Regulations has remained unchanged since 2013, BREEAM UK New Construction 2018 has revised the translators to reflect improvements in the energy efficiency of new buildings.

Accordingly, the translator curves used to determine the Energy Performance Ratios (EPRs) for each of the three energy metrics, energy demand, primary energy consumption and carbon emissions, and hence the overall EPR_{NC} for compliance modelling, have been updated. The distribution of the ratio of Actual/Notional building performance was determined which then informs the unweighted Energy Performance Ratios (EPRs) so that a specific Energy Performance Ratio (unweighted) will be achieved where the assessed building achieves a defined percentage improvement on the notional building standard.

A representative sample of buildings that underwent BREEAM assessment under the 2014 scheme were used to determine the 2018 translator curves for England. Using actual performance data to benchmark performance data means that the energy performance is directly comparable to other BREEAM assessed buildings. However, for Scotland, Wales and Northern Ireland sample sizes are currently insufficient to adopt this method and so the translator curves for these countries were based on the 2014 methodology using an updated energy performance specification.

England translators

A representative sample of buildings that underwent BREEAM assessment under the 2014 scheme were used to determine the 2018 translator curve for each of the three energy metrics. Here the mean A/N value for the sample defines the 0.5 policy decision point for all three translator curves. This means that the unweighted EPR scores directly reflect where the performance sits within the distribution for BREEAM assessed buildings.

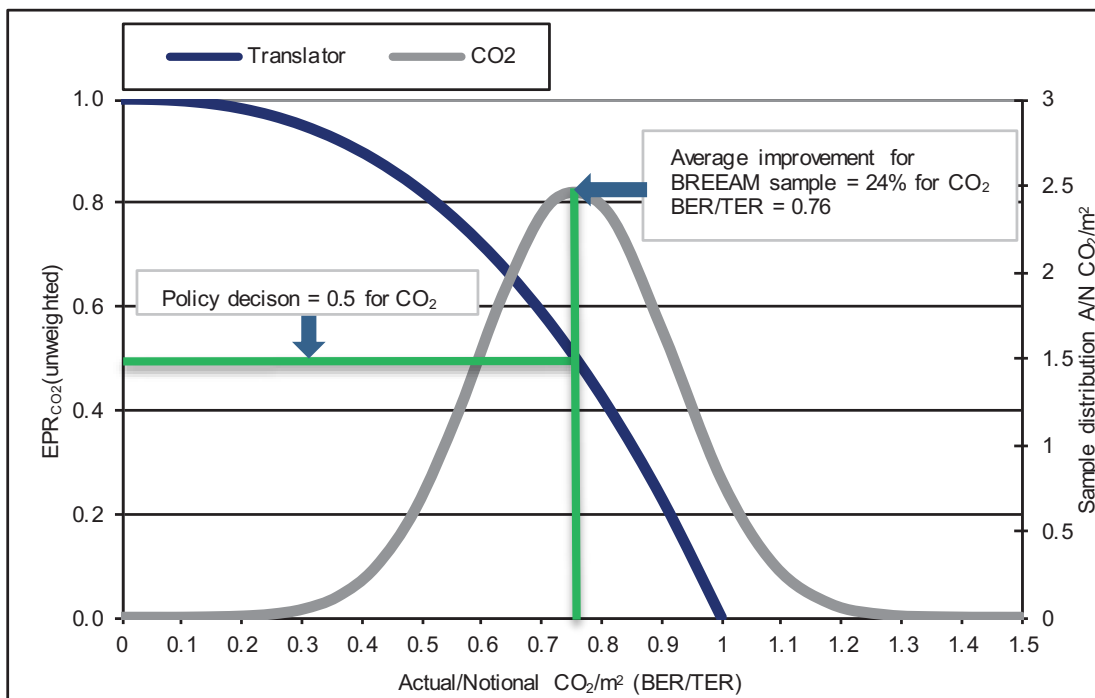


Figure 3 - Example Ene 01 building performance translator England

1 This was previously referred to as a best practice specification. However, as the approach used specifies high performance components rather than taking a holistic approach to optimise energy performance, hence hypothetical high performance specification is considered a more appropriate term.

Scotland, Wales and Northern Ireland translators

For other countries it was not possible to use data from BREEAM assessed building to determine the translator curves as the sample sizes were insufficient. Therefore, the methodology for the 2014 translators was used, but with the high performance specification updated to take account of improvements in plant and equipment efficiencies. These translators were devised based on a sample of building models converted to comply with the relevant building regulations for each country and then modified to a high performance specification that comprises high thermal performance parameters, equipment and system efficiencies, etc..

Using the data from this modelling, an average high performance improvement factor was determined for each of the three parameters as well as a normal distribution of performance for each parameter for the range of buildings modelled (graphically represented by the bell curve in the example below). This average performance improvement, coupled with a number of 'policy' decisions, described below, were then used to define a means of benchmarking actual building performance (graphically represented by the curve in the following example).

Ene 01 building performance translator
Example: CO₂, Wales

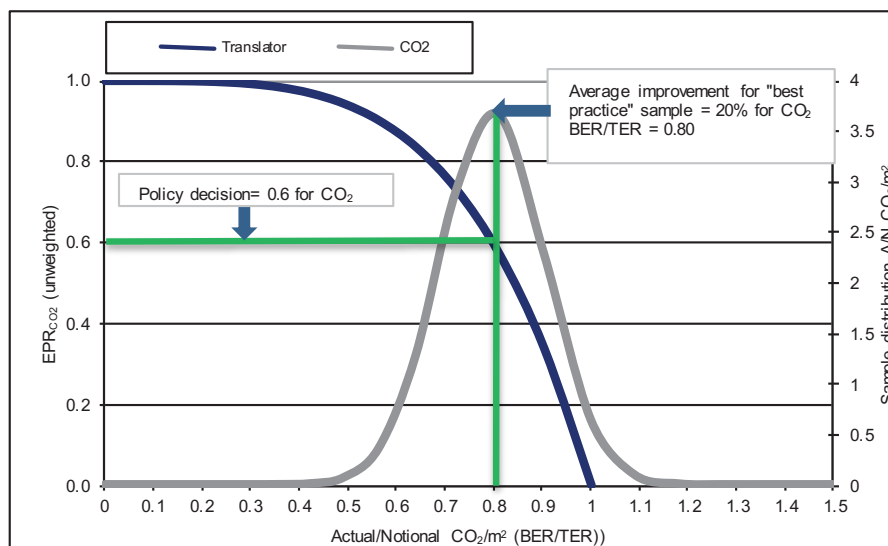


Figure 4 - Example Ene 01 building performance translator Wales

Unweighted Energy Performance Ratio

The unweighted Energy Performance Ratio (EPR) for each parameter is derived by determining the point that the assessed building's performance, as a proportion of actual performance compared with notional performance, intersects with the translator curve. Using the above graph as an example for the CO₂ parameter, a building with carbon dioxide emissions 10% lower than the notional building, i.e. the proportion of its emissions is 0.9 of the notional building emissions, would achieve an Energy Performance Ratio (unweighted) for the CO₂ parameter of about 0.35 (0.325 to be precise).

Policy decisions

Each parameter translator curve is defined from the modelled building stock, and the following 'policy' decisions.

A specific Energy Performance Ratio (unweighted) will be achieved where the assessed building achieves a defined percentage improvement on the notional building standard, where the defined percentage improvement is based on the average of the modelled building stock.

The policy decision points defined by the EPRs for each country are shown in the table below:

Table 1 – Policy decision points for each parameter country

Parameter	England	Scotland, Wales and Northern Ireland
Building heating and cooling energy demand	0.5	0.8
Primary energy consumption	0.5	0.8
Carbon dioxide (CO ₂) emissions	0.5	0.6

Whilst the EPRs that define average high performance values for Scotland, Wales and Northern Ireland are the same, the average high performance improvements differ depending on the notional building baseline for each country.

For example, for the carbon dioxide emissions for a building in Wales, an Energy Performance Ratio of 0.8 will be achieved where the actual building achieves a defined high performance level for demand that is approximately a 20% improvement on the notional building standard, whereas for Northern Ireland it is 28% and for Scotland 2013 it is 26%.

See the table below for the average high performance improvements for each country by percentage improvement and by proportion of actual to notional performance (proportion A/N).

Table 2 - Average performance improvements for each country

Country	Wales (high performance)		Scotland (high performance)	
	% improvement	Proportion A/N	% improvement	Proportion A/N
Parameter				
Building heating and cooling energy demand	16%	0.84	18%	0.82
Primary energy consumption	28%	0.72	32%	0.68
Carbon dioxide (CO ₂) emissions	20%	0.80	26%	0.74
Country	Northern Ireland (high performance)		England (average BREEAM)	
Parameter	% improvement	Proportion A/N	% improvement	Proportion A/N
Building heating and cooling energy demand	24%	0.76	23%	0.77
Primary energy consumption	31%	0.69	16%	0.84
Carbon dioxide (CO ₂) emissions	34%	0.66	24%	0.76

The translator curves for each parameter for Wales, Northern Ireland and England and for CO₂ for Scotland are derived by generating a curve that connects three points:

1. Proportion A/N = 1, EPR = 0
2. Proportion A/N = average BREEAM (for England) or "high performance" (for other countries) EPR for 'policy decision'
3. Proportion A/N = 0, EPR = 1

This curve is formed from the following equation:

$$\text{Energy Performance Ratio (unweighted)} = 1 - (A/N)^n$$

where:

A = actual building performance

N = notional building performance

n = a function of the parameter EPR at the 'policy decision' and the average proportion of actual / notional building performance.

EPR = parameter Energy Performance Ratio (unweighted)

Table 3 - 'n' value for each parameter and country

Parameter	Wales	Scotland	Northern Ireland	England
Building heating and cooling energy demand	9.08	8.23	5.88	2.67
Primary energy consumption	4.87	4.13	4.42	3.92
Carbon dioxide (CO ₂) emissions	4.04	2.98	2.22	2.49

The BREEAM EPRNC weightings

The 2018 Ene 01 methodology gives equal weighting to all three energy parameters to ensure that each parameter is given equal consideration when assessing the overall performance in terms of BREEAM credits.

Table 4 - Weightings for each parameter and country

Parameter	All countries
Building energy heating and cooling demand	0.333
Primary energy consumption	0.333
Carbon dioxide (CO ₂) emissions	0.333

Relationship between different country translators

The translator approach helps to improve the comparability between different parts of the UK by reflecting the fact that the different building regulations / regulatory baselines differ.

Figure 5 illustrates the different country translators for CO₂ emissions.

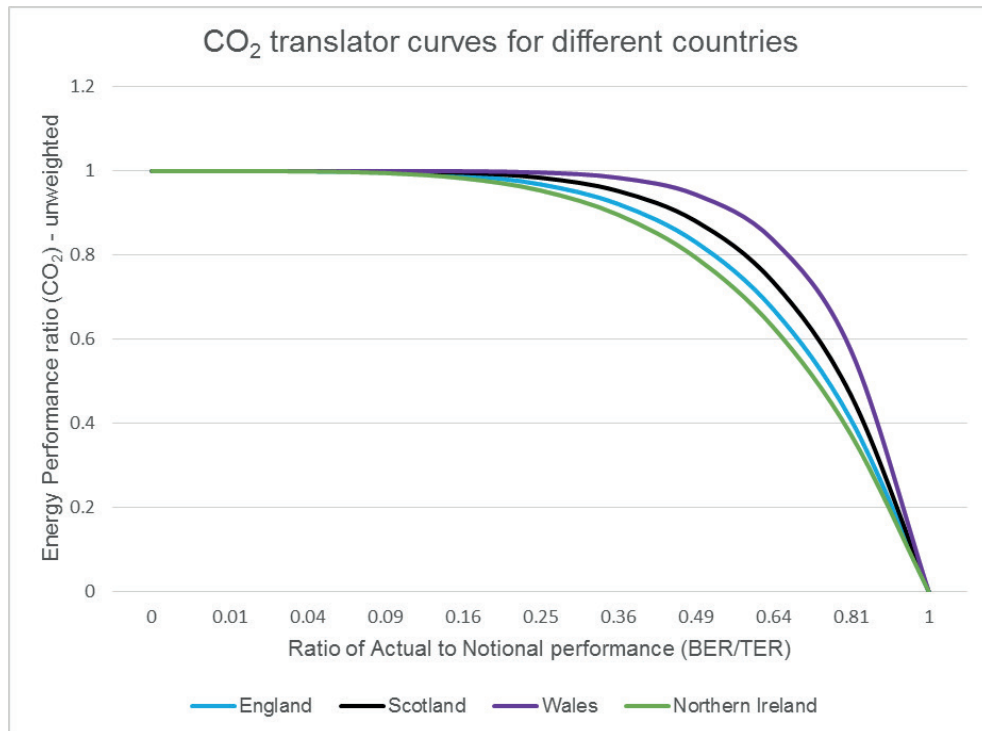


Figure 5 - Different country translators for CO₂ emissions

It can be seen that the translator for England is more generous than that for Northern Ireland. If for example a building were to achieve a 20% improvement over the TER (equivalent to 0.8 on the X-axis), then this would equate to an EPR of about 0.427 in England, but only about 0.390 for Northern Ireland. This reflects the fact that it is more difficult to achieve an improvement over the regulatory baseline in England.

This means that the methodology leads to a converging of the standards at higher levels, and therefore better performing buildings will tend to achieve a similar number of credits in the different countries for identical designs.

The BREEAM credits scale and minimum standards

The number of BREEAM credits is determined by the EPR_{NC} for the building. The credit scale is given in Table – 6.1: Ene 01 EPR_{NC} benchmark scale in the BREEAM UK New Construction 2018 technical manual. There are up to 9 standard credits available.

The EPR_{NC} required to achieve 1 credit is 0.01 and there is a linear scale up to an EPR_{NC} of 0.9 for 9 credits. This entry level serves to recognise buildings which achieve a small improvement over a Building Regulations compliant design. Table 5 describes the BREEAM New Construction scheme's minimum standards for Ene 01.

Table 5 - Ene 01 minimum standards

BREEAM credits	EPR _{NC}	Minimum standards
1	0.1	To achieve at least one Ene 01 credit
4	0.4	To achieve an Excellent rating
6	0.6	To achieve an Outstanding rating
9	0.9 AND zero net regulated CO ₂ emissions	

The maximum number of standard BREEAM credits, 9, is awarded where a building achieves an EPR_{NC} of 0.90 and a 100% improvement on the building regulations Target Emission Rate i.e. a net zero regulated carbon building. This could be achieved by this example:

Table 6 - Example of how to achieve 9 credits for a building located in Wales

Parameter	% performance improvement	Proportion of actual/ notional performance	EPR (unweighted)	Weighting	EPR (weighted)
Building energy heating and cooling demand	30%	0.7	0.961	0.333	0.320
Primary energy consumption	30%	0.7	0.824	0.333	0.275
Carbon dioxide (CO ₂) emissions	100%	0	1	0.33	0.333

$$\begin{aligned}
 \text{EPR}_{\text{NC}} &= \text{EPR}_{\text{dem}} + \text{EPR}_{\text{PC}} + \text{EPR}_{\text{CO}_2} \\
 &= 0.320 + 0.275 + 0.333 \\
 &= 0.928
 \end{aligned}$$

Example calculation

The following provides an example calculation of each of the three stages of the methodology for a building located in England.

Stage 1: Define the building's performance as a proportion of the BREEAM 2018 notional building level

$$\begin{aligned}
 \text{Demand (MJ/m}^2 \text{ yr):} & \quad 65 / 80 = 0.813 \\
 \text{Consumption (kWh/m}^2 \text{ yr):} & \quad 250 / 300 = 0.833 \\
 \text{Carbon dioxide (kg CO}_2 \text{ /m}^2 \text{ yr):} & \quad 40 / 50 = 0.800
 \end{aligned}$$

Stage 2: Benchmark the performance improvement against the modelled building stock i.e. the point that a building's performance as a proportion intersects with the translator curve

$$\begin{aligned}
 \text{Unweighted demand ratio:} & \quad 1 - (0.813 \wedge 2.67) = 0.426 \\
 \text{Unweighted consumption ratio:} & \quad 1 - (0.833 \wedge 3.92) = 0.511 \\
 \text{Unweighted carbon dioxide ratio:} & \quad 1 - (0.800 \wedge 2.49) = 0.427
 \end{aligned}$$

Stage 3: Apply the weightings

Weighted demand ratio: $0.426/3 = 0.142$

Weighted consumption ratio: $0.551/3 = 0.170$

Weighted carbon dioxide ratio: $0.427/3 = 0.142$

Stage 4: Determining the number of BREEAM credits

Overall EPRNC : $0.142 + 0.170 + 0.142 = 0.455$

Look up the number of credits and the minimum standards achieved from the credit table in the technical manual. No. of BREEAM credits: 4 BREEAM credits

This meets the minimum standard for an Excellent rating.

Note that in instances where the actual building performance values are worse than that of the notional buildings this will result in a negative EPR and so the numbers of credits awarded will be adversely affected by poor performance for a particular metric. Furthermore, no credits will be awarded if the CO₂ emissions for the actual building (BER) is higher than the notional (TER).

This Guidance Note on the Ene 01 Methodology is available to download from the BREEAM Assessors' Extranet and the BREEAM website (see the Resources section).

Appendix – EPR tables

England

% improvement	Proportion actual/ notional, A/N	Contribution to demand EPR	Contribution to EPR consumption	Contribution to CO ₂ EPR
0%	1	0	0	0
1%	0.99	0.0088	0.0129	0.0082
2%	0.98	0.0175	0.0254	0.0164
3%	0.97	0.0261	0.0376	0.0244
4%	0.96	0.0345	0.0493	0.0323
5%	0.95	0.0427	0.0608	0.0400
6%	0.94	0.0508	0.0719	0.0476
7%	0.93	0.0588	0.0826	0.0552
8%	0.92	0.0666	0.0930	0.0626
9%	0.91	0.0743	0.1031	0.0698
10%	0.90	0.0819	0.1129	0.0770
11%	0.89	0.0893	0.1223	0.0840
12%	0.88	0.0965	0.1315	0.0910
13%	0.87	0.1037	0.1403	0.0978
14%	0.86	0.1106	0.1489	0.1045
15%	0.85	0.1175	0.1572	0.1110
16%	0.84	0.1242	0.1652	0.1175
17%	0.83	0.1308	0.1729	0.1238
18%	0.82	0.1373	0.1803	0.1301
19%	0.81	0.1436	0.1875	0.1362
20%	0.80	0.1498	0.1945	0.1422
25%	0.75	0.1789	0.2255	0.1706
30%	0.70	0.2049	0.2511	0.1963
35%	0.65	0.2280	0.2719	0.2194
40%	0.60	0.2483	0.2884	0.2400
45%	0.55	0.2660	0.3014	0.2582
50%	0.50	0.2811	0.3114	0.2741
55%	0.45	0.2939	0.3188	0.2878
60%	0.40	0.3046	0.3242	0.2994
65%	0.35	0.3132	0.3279	0.3090
70%	0.30	0.3200	0.3304	0.3168
75%	0.25	0.3252	0.3319	0.3228
80%	0.20	0.3288	0.3327	0.3273
100%	0	0.3333	0.3333	0.3333

The percentage improvement is the reduction of demand, consumption or CO₂ emissions for the actual building compared with the building regulations compliant standard.

Northern Ireland

% improvement	Proportion actual/ notional, A/N	Contribution to demand EPR	Contribution to EPR consumption	Contribution to CO ₂ EPR
0%	1	0	0	0
1%	0.99	0.0191	0.0145	0.0073
2%	0.98	0.0373	0.0285	0.0146
3%	0.97	0.0547	0.0420	0.0218
4%	0.96	0.0712	0.0550	0.0288
5%	0.95	0.0868	0.0676	0.0358
6%	0.94	0.1017	0.0798	0.0427
7%	0.93	0.1158	0.0915	0.0495
8%	0.92	0.1292	0.1028	0.0563
9%	0.91	0.1419	0.1136	0.0629
10%	0.90	0.1540	0.1241	0.0694
11%	0.89	0.1654	0.1342	0.0759
12%	0.88	0.1762	0.1439	0.0823
13%	0.87	0.1864	0.1532	0.0885
14%	0.86	0.1961	0.1622	0.0947
15%	0.85	0.2052	0.1708	0.1008
16%	0.84	0.2138	0.1791	0.1069
17%	0.83	0.2219	0.1870	0.1128
18%	0.82	0.2296	0.1947	0.1186
19%	0.81	0.2368	0.2020	0.1244
20%	0.80	0.2436	0.2090	0.1301
25%	0.75	0.2720	0.2399	0.1572
30%	0.70	0.2924	0.2644	0.1822
35%	0.65	0.3069	0.2837	0.2051
40%	0.60	0.3168	0.2985	0.2259
45%	0.55	0.3234	0.3096	0.2448
50%	0.50	0.3277	0.3178	0.2616
55%	0.45	0.3303	0.3236	0.2766
60%	0.40	0.3318	0.3275	0.2896
65%	0.35	0.3326	0.3301	0.3008
70%	0.30	0.3331	0.3317	0.3102
75%	0.25	0.3332	0.3326	0.3179
80%	0.20	0.3333	0.3331	0.3239
100%	0	0.3333	0.3333	0.3333

The percentage improvement is the reduction of demand, consumption or CO₂ emissions for the actual building compared with the building regulations compliant standard.

Scotland

% improvement	Proportion actual/ notional, A/N	Contribution to demand EPR	Contribution to EPR consumption	Contribution to CO ₂ EPR
0%	1	0	0	0
1%	0.99	0.0265	0.0136	0.0098
2%	0.98	0.0511	0.0267	0.0195
3%	0.97	0.0739	0.0394	0.0290
4%	0.96	0.0951	0.0517	0.0382
5%	0.95	0.1148	0.0636	0.0473
6%	0.94	0.1330	0.0752	0.0562
7%	0.93	0.1499	0.0863	0.0649
8%	0.92	0.1655	0.0971	0.0734
9%	0.91	0.1799	0.1075	0.0818
10%	0.90	0.1933	0.1176	0.0899
11%	0.89	0.2056	0.1274	0.0979
12%	0.88	0.2169	0.1367	0.1057
13%	0.87	0.2274	0.1458	0.1133
14%	0.86	0.2370	0.1546	0.1208
15%	0.85	0.2458	0.1630	0.1281
16%	0.84	0.2540	0.1711	0.1352
17%	0.83	0.2614	0.1789	0.1422
18%	0.82	0.2682	0.1865	0.1490
19%	0.81	0.2745	0.1937	0.1556
20%	0.80	0.2802	0.2007	0.1621
25%	0.75	0.3021	0.2318	0.1921
30%	0.70	0.3156	0.2569	0.2183
35%	0.65	0.3237	0.2771	0.2412
40%	0.60	0.3284	0.2929	0.2607
45%	0.55	0.3309	0.3051	0.2773
50%	0.50	0.3322	0.3143	0.2912
55%	0.45	0.3329	0.3210	0.3026
60%	0.40	0.3332	0.3258	0.3117
65%	0.35	0.3333	0.3290	0.3188
70%	0.30	0.3333	0.3310	0.3242
75%	0.25	0.3333	0.3322	0.3280
80%	0.20	0.3333	0.3329	0.3306
100%	0	0.3333	0.3333	0.3333

The percentage improvement is the reduction of demand, consumption or CO₂ emissions for the actual building compared with the building regulations compliant standard.

Wales

% improvement	Proportion actual/ notional, A/N	Contribution to demand EPR	Contribution to EPR consumption	Contribution to CO ₂ EPR
0%	1	0	0	0
1%	0.99	0.0291	0.0159	0.0133
2%	0.98	0.0559	0.0312	0.0262
3%	0.97	0.0805	0.0459	0.0386
4%	0.96	0.1032	0.0601	0.0507
5%	0.95	0.1241	0.0737	0.0624
6%	0.94	0.1433	0.0867	0.0738
7%	0.93	0.1608	0.0992	0.0848
8%	0.92	0.1770	0.1112	0.0954
9%	0.91	0.1917	0.1227	0.1057
10%	0.90	0.2053	0.1338	0.1157
11%	0.89	0.2176	0.1443	0.1253
12%	0.88	0.2289	0.1545	0.1346
13%	0.87	0.2392	0.1641	0.1435
14%	0.86	0.2486	0.1734	0.1522
15%	0.85	0.2571	0.1822	0.1606
16%	0.84	0.2649	0.1907	0.1687
17%	0.83	0.2719	0.1988	0.1764
18%	0.82	0.2783	0.2065	0.1839
19%	0.81	0.2841	0.2139	0.1912
20%	0.80	0.2894	0.2209	0.1981
25%	0.75	0.3089	0.2512	0.2292
30%	0.70	0.3203	0.2746	0.2546
35%	0.65	0.3267	0.2924	0.2750
40%	0.60	0.3301	0.3056	0.2911
45%	0.55	0.3319	0.3152	0.3036
50%	0.50	0.3327	0.3219	0.3131
55%	0.45	0.3331	0.3265	0.3201
60%	0.40	0.3333	0.3295	0.3251
65%	0.35	0.3333	0.3313	0.3286
70%	0.30	0.3333	0.3324	0.3308
75%	0.25	0.3333	0.3329	0.3321
80%	0.20	0.3333	0.3332	0.3328
100%	0	0.3333	0.3333	0.3333

The percentage improvement is the reduction of demand, consumption or CO₂ emissions for the actual building compared with the building regulations compliant standard.