



Non-Domestic Energy Assessment Procedure Survey Guide

VERSION: 1.0

NEAP is the official procedure for the calculation of energy performance of non domestic buildings in Ireland for the purposes of producing Building Energy Ratings (BER).

This document describes the NEAP survey methodology for non domestic buildings. The NEAP Manual (iSBEM User Guide) detailing the assessment methodology for non domestic buildings must be followed alongside this document.

BER Assessors, building designers and other users should ensure that they are using the latest version of this document and accompanying software. Information and any updates will be published on the SEAI website at www.seai.ie/ber.

Full surveys are to be carried out for “New-final” or “Existing” building assessments. “New-provisional” ratings do not require a site survey as the provisional rating is carried out off plans and specifications for buildings at design stage.

A BER Assessor is required to act with integrity and diligence to ensure that each BER assessment is executed competently, in an independent manner and in accordance with the Regulations, the BER Assessor’s Code of Practice and all other directions issued by SEAI. In this regard a BER Assessor is responsible for ensuring that, within reason, the data compiled and inputted to SEAI approved calculation software and all other related and recorded calculations are an accurate representation of all characteristics relevant to the energy performance of the building and are capable of being verified as such in any subsequent monitoring and compliance processes commenced by SEAI.

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w www.seai.ie/Your_Building/BER

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1. Introduction

This guide is designed to assist Building Energy Rating (BER) Assessors to carry out BER assessments on new final and existing non domestic buildings using iSBEM or other approved software¹.

This manual does not replace the iSBEM User Guide. It provides additional guidance relating specifically to surveying of non domestic buildings and should be read in conjunction with the iSBEM User Guide or other guides associated with the approved software being used by the Assessor.

In addition to providing guidance on the surveying of buildings, this Survey Guide indicates the necessary supporting data or evidence required when completing BER assessments on buildings particularly when using values other than the defaults.

This Survey Guide is expected to be updated at regular intervals or as necessary. Up to date versions can be downloaded from www.seai.ie/ber.

When conducting a survey, BER Assessors must comply with the Safety, Health and Welfare at Work Act 2005 and regulations under that Act, as well as all other applicable health and safety legislation, regulations, codes and guidelines. It is the BER Assessor's duty to make himself or herself familiar with the relevant health and safety rules, to exercise due diligence during the survey and to prevent unreasonable risk of harm or injury. Please refer to the Health and Safety Authority website for further information: www.hsa.ie .

BER Assessors are solely responsible for undertaking surveys in a safe manner. The BER Assessor should under no circumstances expose himself or herself, or any other person, to unnecessary risks of harm or injury in conducting a building survey. The BER Assessor must be mindful at all times of health and safety issues and, where the BER Assessor has reason to believe that obtaining any of the information set out in this document, or any other associated guidance provided by SEAI, may involve such risks, the BER Assessor need not and must not attempt to obtain that information.

SEAI and its agents accept no liability or responsibility for any damage, injury, death, breach of contract or negligence in respect of any dispute, claim or cause of action arising out of, or in relation to, any BER assessment.

Surveys are expected to be non-invasive. Nothing in this document, the SBEM manual or any other associated guidance provided by SEAI, shall be understood as requiring invasive surveys. Where, despite this, BER Assessors or their client carry out invasive surveys this is carried out at the BER Assessor's own and the building owner's risk and is not required by SEAI.

If invasive survey methods are used such as to demonstrate non-default data, then, while these methods are not required in the BER assessment methodology, they can be considered as a source of supporting evidence. This supporting evidence for each relevant exposed surface must clearly indicate that the non-default data being specified is appropriate for the building element in question.

Where the survey requires access to the Building Management System (BMS), the Assessor should seek out assistance from the Facilities Manager/ Building Operator and take due care and consideration not to interfere with the setup of the BMS.

¹ Throughout this Guide, the term "Approved Software" is used to denote iSBEM and other SEAI approved BER software as published on http://www.seai.ie/Your_Building/BER/Non_Domestic_buildings/Non_domestic_Energy_Assessment_Procedure_NEAP/

BER Assessors are required to adhere to the BER Assessor's Code of Practice at all times and the definitions in the iSBEM Manual must be followed at all times.

2. Pre-survey Information Request

Prior to carrying out the survey, the Assessor should formally request from the building owner/representative information such as:

- Age of building;
- Details of planning permission (reference, date);
- Access to architectural drawings and specifications for layout configuration and details of construction;
- Access to any mechanical and electrical drawings or specifications which would assist the Assessor in determining the nature of the equipment installed;
- Details of building type and activities within the Building;
- Details of any modifications made in the building e.g. insulation upgrading, additional/upgraded controls, new lighting, new boilers, additional equipment, extensions, etc.;
- Certification to prove that the ducting was pressure tested;
- If the HVAC system is separately sub-metered and if so, where the meters are located;
- Any other information related to the heating, cooling, ventilation and air conditioning (HVAC) systems which may not be obvious but may have an impact on the BER;
- Any additional documentary evidence that the owner feels is important.

Where such information is available, documentary evidence should be obtained (rather than verbal briefing). Any documentary evidence of upgrading must clearly relate to the building concerned and must be sufficiently detailed in its scope. The substantiation that would be acceptable for QA audit purposes is detailed in Section 7 of this document and where such evidence is used for BER purposes a copy of this evidence should be retained by the Assessor and provided to SEAI QA auditors on request.

The Assessor should inform the owner in writing that access to all areas in the building including boiler rooms, any hatches which provide access to insulation, controls and pipework will be required in order to carry out the survey.

3. Survey Documentation and Equipment

A number of items should be brought to the survey site to enable the successful conduct of the survey of the building. These include (but are not limited to):

Documentation:

- Approved Software Manual;
- NEAP Survey Guide;
- The NEAP Survey Form (Appendix 1), or similar data collection sheet/drawings (also available in electronically editable format on www.seai.ie/ber).
- Pencil, paper and eraser;
- Graph Paper (for sketching building plans and elevations);
- Architectural plans for the building where available;
- Any other available specifications for the building.

Equipment:

- Measuring tape. Electronic measuring devices may be used, provided all measurements are accurate and the equipment is properly calibrated;

- Ruler;
- Calculator;
- Directional compass;
- Flashlight;
- Camera with flash (with macro capability to ensure text is clearly legible);
- Key for electricity meter and key for gas meter (standard tools will not open gas or electricity meters);
- Ladder (to facilitate inspection of ceiling voids and access to any roof where plant is located);
- Personal protective equipment as necessary.

4. Data Gathering

For all data gathered, supporting documentary evidence will be required to substantiate any entries in the NEAP software. This documentary evidence should be retained by the Assessor as outlined in the BER Assessor's Code of Practice. BER Assessors should endeavour to gather as much data, photographs and supporting evidence as possible to increase the likelihood of an accurate survey and assessment which will stand up to auditing by SEAI.

The list of supporting evidence detailed in this guide is for guidance purposes and will be added to over time. Other methods/supporting data may be considered by SEAI on a case by case basis, as they arise.

Where "As Built" drawings and specifications are available for a building, it is the responsibility of the Assessor to verify that the data is accurate through a site survey and to ensure that any data input into the NEAP software is accurate.

Specific queries related to the acceptability of supporting data should be directed to the BER Helpdesk prior to the publication of a rating.

The NEAP Survey Form (Appendix 1) assists Assessors in ensuring that they have gathered all the necessary data during the survey of a building. This includes data regarding the dimensions, building age, building fabric elements, relevant items per room, HVAC system(s), hot water services, HVAC controls, lighting and lighting controls. This should be accompanied by building sketches/architectural drawings and comments related to various aspects of the site survey.

4.1 External Survey

An initial survey of the outside of the building should be carried out. Information which can be gathered through this external survey is as follows:

- External measurements to establish/check the overall footprint of the building. External measurements must be converted to internal measurements before calculating floor area and heat loss areas;
- Establishing ventilation features such as number of vents, extract fans, air intakes and external air handling plant.
- Assessing age band indications, such as meter box date information;
- Confirming the orientation of the building using a directional compass;
- Establishing which walls of the building are party walls and determining, as far as possible, the nature of the activity of the adjoining buildings;
- Establishing shading characteristics;
- Details of any renewable technologies, such as solar panels and wind turbines.
- Establishing any external plant rooms/ energy centres serving the building.

4.2 Internal Survey

An initial walk around inside the building is very useful and will assist in determining the following information:

- Confirming the Building Activities;
- Confirming the various HVAC systems within the building;
- Confirming the various Lighting and Lighting Control systems within the building;
- Confirming heat loss envelope elements such as ground floor type(s), wall types, window variations and in completing survey sketches for each floor, wall and other element types;
- Assessing age band indications such as date stamp in the gap within double/triple glazing;
- Confirming the ventilation as indicated from outside the building. Checking that no vents have been blocked, and identifying the type of controls (if any) on the vents;
- Identifying thermal mass composition, i.e. external wall, internal partitions, floors.

4.3 Building Sketches and Architectural Drawings

A sketch of the building must be made with plans and elevations. Where architectural drawings are available, these can be used instead of sketches provided any differences between the architectural drawings and actual measurements taken on site are noted on the architectural drawings by the BER Assessor. The sketches and/or architectural drawings should be kept on file as supporting evidence for the BER assessment. The dimensions used in the NEAP assessment should reflect the actual measurements taken during the survey. Sketches, combined with the Survey Form and other evidence as outlined in this document, are required to support data entered in the data file to complete a BER assessment using the iSBEM or other software.

As a guide, the sketches/drawings should at least indicate the following:

- Each zone entered in NEAP software;
- Different walls, floors and roof types;
- Dimensions (total floor area, zone areas, wall thickness, floor heights, element dimensions);
- Unconditioned spaces – identifying elements between conditioned and unconditioned spaces;
- Adjacent buildings (beside party wall);
- Openings:
 - Door types, dimensions and orientations (with estimate of percentage glazing);
 - Window dimensions and orientations;
 - Type(s) of glazing (e.g. single glazed, double glazed, any information about filling or glazing type);
 - Opening frame type(s) (PVC, Wood, metal and estimate of thermal break if possible to determine);
 - Measured gap between panes if possible, not including the thickness of the glazing panes;
 - Overshading estimate on each opening;
- Extensions/ alterations to the building – identifying where the age of the building differs.

4.4 Floor by Floor Survey

A sketch or architectural drawing shall be provided for each floor showing partitions, wall openings and zones. Where architectural drawings are used, it is the responsibility of the Assessor to ensure the accuracy of the drawings in relation to the finished construction; therefore architectural drawings may be altered to reflect changes in the finished building.

Each room/area should be checked for the following:

- Activity in each area;
- Type of HVAC in each area and how it is controlled;

- Type of lighting and how it is controlled;
- Any additional ventilation, separate to the main HVAC system in each area;
- Properties of openings such as:
 - Type of glazing (double, single, triple, stamp/brand on windows);
 - Dimensions;
 - Frame type;
 - Gap between glazing;
 - Overshading;
 - Orientation;
- Room heights.

This information should all be collected in the NEAP Survey Form (Appendix 1).

Assessor should refer to Appendix 2 for Guidance on Zoning and Appendix 3 for a List of Activities.

4.5 Plant Room Survey

Each plant room should be surveyed with particular reference to the following.

- Boiler plant;
- Refrigeration plant ;
- Air handling units;
- Fans;
- Calorifiers;
- Heat exchangers;
- Heat recovery equipment;
- Controls related to all building services plant.

For all plant items, eg, boilers, refrigeration equipment, air handling units, fans, humidifiers, heat recovery units, heat exchangers, hot water calorifiers, pumps, nameplate details should be recorded where accessible and a photo taken to facilitate later identification of the equipment concerned in support of data entered in the data file.

4.6 Ceiling & Floor Voids

Ceiling and floor voids which are accessible should be inspected to determine what equipment, particularly HVAC equipment, is present. This will provide useful information as to the type of HVAC used in the building. Where possible, photos should be taken to demonstrate the HVAC systems present.

4.7 Attic Spaces

Useful building compositional properties can be determined by accessing the attic space where such exists:

- Evidence of wall and roof construction;
- Roof insulation thickness.

Particular attention must be paid to health and safety issues when accessing attic spaces and ceiling voids.

5. BER Assessor Using Assistance to Gather Information

BER Assessors are required to abide by all the terms and conditions outlined in the Code of Practice for BER Assessors. This includes the condition that a BER Assessor must take full responsibility for each BER assessment that he or she carries out. Where a BER Assessor is required to visit premises being assessed, the BER Assessor is responsible for:

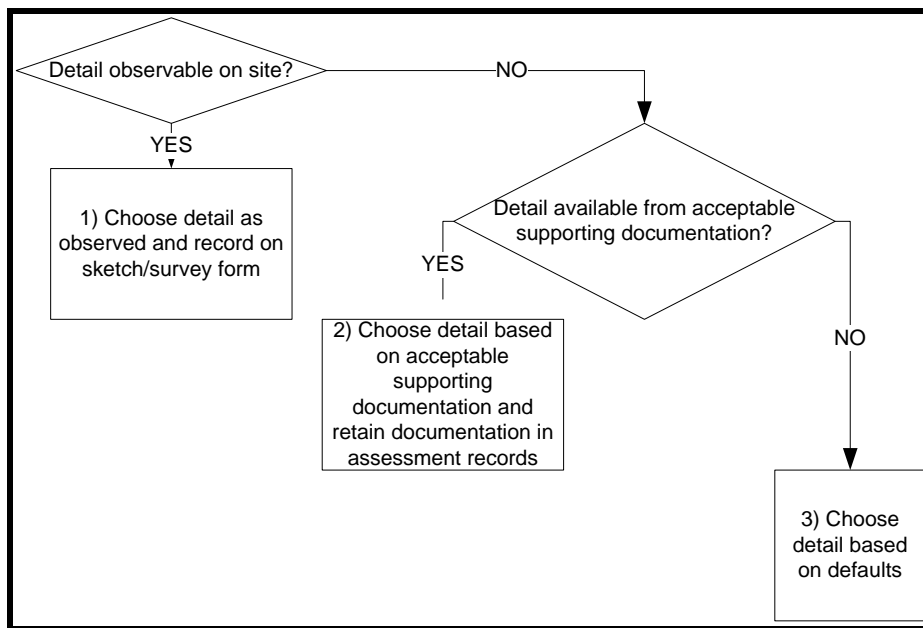
- the collation of the data required for the assessment;
- ensuring that, within reason, the data compiled is an accurate representation of all characteristics relevant to the energy performance of the building;
- verification of data in any subsequent monitoring and compliance processes commenced by SEAI.

6. Guidance on Supporting Evidence

As a general rule the default values in NEAP are conservative and should be used unless non-default values can be supported through acceptable documentary evidence or evidence recorded on site. Assessors are expected to make reasonable efforts to confirm that any default values used are selected correctly and only when non-defaults are unavailable.

The following diagram illustrates the order of priority for each data item in a BER assessment.

1. The actual data observed on site takes precedence.
2. Where the data item is not observable, it should be detailed using documentary evidence. Documentary evidence should be retained with the assessment records.
3. Where the data item is not observable on site or via documentary evidence, then a default is used.



This order of priority should be considered for all parameters entered in the NEAP software. For example, the Assessor is expected to take details of the boilers, check their efficiency as outlined in Section 7 of this document and to use this value if it differs from the default value. As part of an SEAI audit, the Assessor will be expected to show that reasonable efforts were made to ascertain non-default values rather than opting for default values. In all cases, supporting evidence must be obtained and retained by the Assessor for all non-default values used.

Reports of works carried out in the building from a supervising engineer or architect are acceptable as supporting documentary evidence. Such reports need to provide sufficient detail for the NEAP entry in question. For example, for retrofitted insulation, the report should detail the property address, material type, thickness and thermal conductivity, density of fill, etc. Thermal conductivity values for common building materials in new and existing buildings can be obtained from Building Regulation TGD L (Table A1) or from CIBSE Guide A. For existing and new-provisional buildings, Building Regulation TGD L (Table A2) or CIBSE Guide A may be used to determine the thermal conductivities for insulation products; however the preferred option is that thermal conductivity values are obtained for specific insulation products and the data should be obtained from accredited test data in compliance with the relevant standards in TGD L. For new-final BERs, thermal conductivity values for insulation products should be obtained from accredited test data to the relevant standards in TGD L.

7. Information Regarding Individual iSBEM Inputs

The following tables are intended to augment the software application manual (i.e. iSBEM) with regard to the gathering of data for buildings and in confirming compliance with Section 15 (Monitoring and Compliance) of the BER Assessors Code of Practice.

Where documentation is used to substantiate non-default values, it should describe the nature of the work in detail and leave no doubt that it is related to the building being assessed.

The list of supporting evidence detailed in this section is for guidance purposes and may be amended over time. If an Assessor is in doubt whether or not the evidence recorded meets requirements in terms of evidence, the Assessor should contact the BER helpdesk. Other methods/supporting data may be considered by SEAI on a case by case basis, as they arise.

iSBEM Software Tab: "General"		
Data Entry Item	Guidance	Documentary Evidence
Project Complexity	Complexity of the building for the purposes of the Building Energy Rating. Refer to Section 7.3.2 of iSBEM User Guide.	External/Internal photographs of the Building to indicate the complexity of the building.
Building Type	This will generally be obvious; office block, school, factory, warehouse, etc. This relates to the current building use which may have changed since the building was built, eg, school house converted to restaurant.	Internal photographs showing the building type; Architectural drawings; Correspondence from client detailing the building type.
Age of building	This is a key item of information because it forms the basis for selecting default values which in turn have a significant impact on the rating obtained. It is the completion date of the building that is required. Similar methods should be applied when determining the age of any extensions/major refurbishments within the building. Assessors should refer to Appendix 4 for the relationship between the age of construction and relevant building regulations.	A copy of building legal documents such as such as the contract to build, final build contract payment certificate, completion cert, etc are the preferred evidence of age. In the absence of such documentation, then a combination of the following indicators may be used (a minimum of two indicators are required): <ul style="list-style-type: none"> • Stylistic evidence; • Planning permission documents; • Building or development age plates; • Electricity meter age; • Glazing age printed within double or triple glazing; • Building owner's knowledge.
MPRN number	The MPRN can be found on the electricity bill	Copy of utility bill for the building or

	<p>for the building. In the absence of electricity bills, the MPRN may be printed in the electricity meter box or this information can be sourced from the ESB. The MPRN extranet on the Non Domestic National Administration System (NDNAS) should be used to confirm that the MPRN is correct.</p>	<p>as supplied by the utility provider. Photograph of the electricity meter box.</p>
<p>Building Address</p>	<p>Address to identify the location of the building, should be taken from utility bills.</p>	<p>Copy of utility bill. The address should allow for unique identification of the property in so far as possible, and in such a way that prospective purchasers or renters (or their agents) can content themselves that the rating before them in fact relates to the property in question. Assessors should confirm the address with the client.</p>

iSBEM Software Tab: "Project Database"		
Data Entry Item	Guidance	Documentary Evidence
Heat loss roof U-values and Thermal Capacity Value k_m	<p>Default values to be used unless acceptable evidence to support non-default values is available. Where default values are used, evidence is required to support age of construction and the type of construction.</p> <p>Non-default values should be used where possible. The Assessor will be expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values. When using non-default U-values for a roof facade, supporting evidence must indicate that the relevant roof facade has achieved the non-default U-value.</p> <p>U-values and k_m values should be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide</p> <p>Where specific thermal properties are not available for building materials in existing buildings, details should be obtained from the Building Regulations TGD L or CIBSE Guide A.</p> <p>For accessible roof void areas, ensure insulation depth is established by taking the average of a number of measurements. Different U-values (e.g. Different depths or materials) must be treated as separate roofs.</p>	<p>The evidence required in order to use non-default building characteristics (eg, U-values) can be met by one of the following:</p> <ul style="list-style-type: none"> • "As Built" drawings showing the makeup of the roof construction including the insulation material used and thickness of the insulation; • Photographs during construction of the element concerned which clearly identify the superior construction and that they are of the building concerned; • Copies of invoices with a detailed description of the work concerned and must clearly identify the work with the building concerned. <p>Documents should indicate address, date and insulation material used. Photographs/photocopies of documentation should be retained as supporting evidence.</p>

<p>Wall U-values and Thermal Capacity Value k_m</p>	<p>Default values to be used unless acceptable evidence to support non-default values is available. Where default values are used, evidence is required to support age of construction and the type of construction.</p> <p>Non-default values should be used where possible. The Assessor will be expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values. When using non-default U-values, supporting evidence must indicate that the entire wall has achieved the non-default U-value.</p> <p>U-values and k_m values should be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide</p> <p>Where specific thermal properties are not available for building materials in existing buildings, details should be obtained from the Building Regulations TGD L or CIBSE Guide A.</p> <p>From details of the wall thickness and surface finishes, the Assessor should calculate the U-value on the assumption that no internal insulation exists.</p>	<p>The evidence required in order to use non-default building characteristics (eg, U-values) can be met by one of the following:</p> <ul style="list-style-type: none"> • “As Built” drawings showing the makeup of the wall construction including the insulation material used and thickness of the insulation; • Photographs during construction of the element concerned which clearly identify the superior construction and that they are of the building concerned; • Copies of invoices with a detailed description of the work concerned and must clearly identify the work with the building concerned. <p>Documents should indicate address, date and insulation material used. Photographs / photocopies of documentation should be retained as supporting evidence.</p>
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<p>Floor U-values and Thermal Capacity Value k_m</p>	<p>Default values to be used unless acceptable evidence to support non-default values is available. Where default values are used, evidence is required to support age of construction and the type of construction.</p> <p>Non-default values should be used where possible. The Assessor will be expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values. When using non-default U-values, supporting evidence must indicate that the entire floor has achieved the non-default U-value.</p> <p>U-values and k_m values should be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide</p> <p>Where specific thermal properties are not available for building materials in existing buildings, details should be obtained from the Building Regulations TGD L or CIBSE Guide A.</p>	<p>The evidence required in order to use non-default building characteristics (eg U-values) can be met by one of the following:</p> <ul style="list-style-type: none"> • “As Built” drawings showing the makeup of the floor construction including the insulation material used and thickness of the insulation; • Photographs during construction of the element concerned which clearly identify the superior construction and that they are of the building concerned; • Copies of invoices with a detailed description of the work concerned and must clearly identify the work with the building concerned. <p>Documents should indicate address, date and insulation material used. Photographs / photocopies of documentation should be retained as supporting evidence.</p>
<p>Door U-Value and Thermal Capacity Value k_m</p>	<p>Default values to be used unless acceptable evidence to support non-default values is available. Where default values are used, evidence is required to support age of construction and the type of door installed.</p> <p>Non-default values should be used where possible. The Assessor will be expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values.</p> <p>U-values and k_m values should be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide.</p>	<p>The evidence required in order to use non-default building characteristics (eg, U-values) can be met by one of the following:</p> <ul style="list-style-type: none"> • “As Built” drawings/ specification detailing the Door make and model and copies of certified U-values; • Copies of invoices with technical characteristics of the door, clearly identifying that it relates to the building concerned. <p>Documents should indicate building address, date and details of the door in question. Photographs / photocopies of documentation should be retained as supporting evidence.</p>

<p>Window U-value, T-Solar and L-Solar</p>	<p>Default values to be used unless acceptable evidence to support non-default values for the U-value, T Solar and L Solar is available. Non-default values must be demonstrated for <u>each</u> of the entries for U-value, T-Solar and L-Solar otherwise default value should be used for <u>all</u>. Where default values are used, evidence is required to support age of construction and the type of window installed.</p> <p>Non-default values should be used where possible. The Assessor will be expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values.</p> <p>Non-default values for U-values, Solar and Light Transmittance values supplied by manufacturers or suppliers should be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide and reference should be made to the relevant standards in any documentation provided by the manufacturer/ supplier.</p>	<p>The evidence required in order to use non-default building characteristics (eg, U-values) can be met by one of the following:</p> <ul style="list-style-type: none"> • “As Built” drawings/ specification detailing the window make and model and copies of certified U-values, solar and light values; • Original installation documentation from the installer detailing window make and model can be used if available (to obtain certified data); • Representative photographs of the window, gap between glazing, manufacturer’s stamp pointing to certified data can be used as supporting evidence. If measuring the gap between glazing panes, ensure that the thickness of the glazing panes is not included in the final glazing gap figure; • Copies of invoices with technical characteristics of the window and must clearly identify the window relates to the building concerned.
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<p>iSBEM Software Tab: “Geometry > Project”</p>		
<p>Data Entry Item</p>	<p>Guidance</p>	<p>Documentary Evidence</p>
<p>Building Infiltration</p>	<p>Use the air permeability default value of 25 m³/h/m² at 50 Pa unless a valid acceptable pressure test certificate is available.</p>	<p>Where a non-default value is used, a copy of the pressure test certificate must be provided with the address of the building being assessed and date of the pressure test.</p> <p>Pressure test certificates must be in compliance with IS EN 13829:2000 “Thermal Performance of Buildings; Determination of Air Permeability of Buildings: Fan Pressurization Method” and CIBSE Technical Manual TM23 “Testing Buildings for Air Leakage”.</p> <p>Individuals/ organisations carrying out pressure tests must also demonstrate</p>

		<p>that they are competent to carry out the testing.</p> <p>Individuals may, for example, demonstrate competence to carry out permeability tests on buildings by being registered under the NSAI's Air Tightness Testers Scheme.</p> <p>Additionally, individuals and organisations may demonstrate competence by being accredited to carry out tests to I.S.EN 13829:2000 by the Irish National Accreditation Board (INAB)</p> <p>or</p> <p>any other bodies capable of providing accreditation to ISO /IEC 17025: "General Requirements for the Competence of Testing and Calibration Laboratories"</p>
Building orientation	The default is set at zero, and should only be changed with caution. Refer to Section 7.5.2 of the iSBEM User Guide.	Copy of site plan of building with orientation or a photograph of compass in relation to the building.
Thermal bridges	<p>For existing buildings, it is unlikely that sufficient evidence will be obtainable to substantiate the use of non-default thermal bridging values.</p> <p>Non-default thermal bridging values should be used where possible for new buildings. The Assessor will be expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values.</p>	<p>Where a non-default value is used, acceptable documentary evidence must be provided for the building.</p> <p>Where accredited data is selected, documentary evidence must be provided that demonstrates that "Limiting Thermal Bridging and Air Infiltration - Acceptable Construction Details" (http://www.environ.ie) as referenced in Building Regulations 2008 TGD L has been conformed to. This requires that the relevant drawings clearly show the relevant details and that these details are checked and signed off by the developer/builder, site engineer or architect.</p> <p>Where calculated psi values are used, documentary evidence in accordance with the methods described in IS EN ISO 10211 Parts 1 and 2 must be provided. These calculations of two dimensional or three dimensional heat flow require the use of numerical modeling software. To be acceptable,</p>

		<p>numerical modeling software should model the validation examples in IS EN ISO 10211 with results that agree with the stated values of temperature and heat flow within the tolerance indicated in the standard for these examples. Several packages are available that meet this requirement. Detailed guidance on decisions regarding specific input to the modeling software and the determination of certain quantities from the output of the software is contained in BRE Report BR 497 Conventions for calculating linear thermal transmittance and temperature factors. This guidance should be followed in carrying out modeling work so that different users of the same software package and users of different software packages can obtain correct and consistent results.</p> <p>Note that NSAI and DEHLG plan to launch a training and registration scheme for individuals carrying out thermal modeling calculation of “psi” values.</p>
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iSBEM Software Tab: “Geometry > Zones > General”		
Data Entry Item	Guidance	Documentary Evidence
HVAC System	<p>The default HVAC systems for buildings are as follows:</p> <ul style="list-style-type: none"> • ‘Heating only - Electric resistance’ - Assumed to be electric central heating system with warm air distribution. If you do not know the heating method you should select electric resistance heating as your default. • “Heating only - Other systems’ - Assumed to be wet radiator system, heat generated by fuel combustion. • ‘Heating and mechanical cooling’ - Assumed to be constant volume air system with terminal reheat and fixed fresh air. This system type is assumed in 	<p>The evidence required in order to use non-default building characteristics can be met by one of the following</p> <ul style="list-style-type: none"> • Copy of as built HVAC drawings and specifications; • Copy of technical details from operational and maintenance manuals; • Representative photographs of the HVAC system.

	<p>conditioned spaces in the absence of details of a HVAC system in plans or from survey.</p> <ul style="list-style-type: none"> If no HVAC system serves a zone within a building (ie an unconditioned zone) select "Zone without HVAC system" <p>For details Refer to 7.5.3 of the iSBEM User Guide.</p> <p>Assessors should refer to Appendix 4 for the details on how Shell and Core building should be dealt with.</p> <p>Assessors should refer to Appendix 4 for the details on how Unheated buildings should be dealt with.</p> <p>A non-default HVAC system may also be defined.</p>	
Building Type/ Activity	<p>The activity specified sets default parameters which the tool uses to calculate the energy consumption. These parameters include temperature set points, heat gains from people and equipment, required illuminance, and fresh air requirements amongst others.</p> <p>For details Refer to 7.5.3 of the iSBEM User Guide.</p>	<p>In combination with the floor by floor sketches /architectural drawings marked up to show zones the following should be provided:</p> <ul style="list-style-type: none"> Survey Form; Note on basis used to define zones.
Area	<p>Floor area of zone.</p> <p>Refer to Section 3.4 Measurement and Other Conventions and Section 7.5.3 of the iSBEM User Guide.</p>	<p>Floor by floor sketches with dimensions and calculations or Architectural drawings with dimensions and calculations marked up to show zones.</p>
Height	<p>Height of zone</p> <p>Refer to Section 3.4 Measurement and Other Conventions and Section 7.5.3 of the iSBEM User Guide.</p>	<p>Building sketches with dimensions, calculations and Survey Form or Architectural drawings with dimensions, calculations and Survey Form.</p> <p>Building sketches/ architectural drawings should show the depth of all components, including floor slabs, floor voids, ceiling voids etc.</p>
Zone Infiltration	<p>Use the air permeability default value of 25</p>	<p>Where a non-default value is used, a</p>

	m ³ /h/m ² at 50 Pa unless a valid pressure test certificate is available.	<p>copy of the pressure test certificate must be provided with the address of the building being assessed and date of the pressure test.</p> <p>Pressure test certificates must be in compliance with IS EN 13829:2000 "Thermal Performance of Buildings; Determination of Air Permeability of Buildings: Fan Pressurization Method" and CIBSE Technical Manual TM23 "Testing Buildings for Air Leakage".</p> <p>Refer to Building Infiltration for guidance on individuals/organisations carrying out tests.</p>
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iSBEM Software Tab: "Geometry > Envelope"		
Data Entry Item	Guidance	Documentary Evidence
Name	Refer to Section 3.6 Nomenclature in iSBEM User Guide for guidance.	Not applicable.
Zone	Zone that envelope element is part of.	Floor by floor sketches with dimensions and Survey Form or Architectural drawings with dimensions and marked up to show zones and Survey Form.
Type of Envelope	Choose between wall, floor/ceiling and roof.	Not applicable.
Construction	Choose from Constructions set up in Project Database for envelope type.	Floor by floor sketches with dimensions and Survey Form and photographs or Architectural drawings with dimensions and marked up to show zones and Survey Form and photographs.
Connects Space to	Choose what conditions apply to the other side of the wall, floor/ceiling or roof. Refer to Section 7.5.4 of iSBEM User Guide for definitions.	Floor by floor sketches with dimensions and Survey Form or Architectural drawings with dimensions and marked up to show zones and Survey Form.
Orientation	Select from one of the available options.	Copy of site plan or sketch of building with orientation and photograph of compass in relation to the building.
Area	Area of envelope inclusive of any windows/	Floor by floor sketches with

	doors. Refer to Section 3.4 of iSBEM User Guide for measurement conventions.	dimensions, calculations and Survey Form or Architectural drawings with dimensions, calculations and marked up to show zones and Survey Form.
Additional Thermal Bridges	For existing buildings, it is unlikely that sufficient evidence will be obtainable to substantiate the use of non-default thermal bridging psi values. Non-default thermal bridging values should be used where possible for new buildings. The Assessor will be expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values.	Where a non-default value is used, acceptable documentary evidence must be provided for the building. Refer to thermal bridging for guidance on documentary evidence required.

iSBEM Software Tab: "Geometry > Doors"		
Data Entry Item	Guidance	Documentary Evidence
Name	Refer to Section 3.6 Nomenclature in iSBEM User Guide for guidance.	Not applicable.
In Envelope	Envelope that Door is part of.	Floor by floor sketches with dimensions and Survey Form or Architectural drawings with dimensions and marked up to show zones and Survey Form.
Type	Choose between High Usage Entrance, Personnel, Vehicle Access Doors as outlined in Part L of the Building Regulations Technical Guidance Document.	Not applicable.
Construction	Choose from Constructions set up in Project Database for door type.	Floor by floor sketches with doors identified and Survey Form and photographs or Architectural drawings with doors identified and marked up to show zones and Survey Form and photographs.
Area	Area of structural opening in wall including frame. Refer to Section 3.4 of iSBEM User Guide for measurement conventions.	Building sketches with dimensions and Survey Form or Architectural drawings with dimensions and Survey Form.

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iSBEM Software Tab: “Geometry > Windows and Rooflights”		
Data Entry Item	Guidance	Documentary Evidence
Name	Refer to Section 3.6 Nomenclature in iSBEM User Guide for guidance.	Not applicable.
In Envelope	Envelope that window/rooflight is part of.	Floor by floor sketches with dimensions and Survey Form or Architectural drawings with dimensions and marked up to show zones and Survey Form.
Glazing Type	Choose between the glazing types defined in Project Database or default glazing.	Floor by floor sketches with glazing type identified and Survey Form and photographs or Architectural drawings with glazing type identified and marked up to show zones and Survey Form and photographs.
Area	Area of structural opening in wall/roof including frame. Refer to Section 3.4 of iSBEM User Guide for measurement conventions.	Building sketches with dimensions and Survey Form or Architectural drawings with dimensions and Survey Form.
Surface Area Ratio	This is the “developed area to projected area” ratio for the window or rooflight as defined in Section 7.5.5 of iSBEM User Guide.	Building sketches with dimensions and Survey Form or Architectural drawings with dimensions and Survey Form.
Area Ratio Covered	This is the ratio of the roof area covered by an array of rooflights to the total area of the rooflight glazing. Refer to Section 7.5.5 of iSBEM User Guide for definition.	Building sketches with dimensions and Survey Form or Architectural drawings with dimensions and Survey Form.
Shading System	Choose from User-moveable external protection, Automatically-controlled external protection, or All other cases. Refer to Section 7.5.5 of iSBEM User Guide for definition.	Building sketches with dimensions and Survey Form and photographs or Architectural drawings with dimensions and Survey Form and photographs.
Transmission Factor	This is the fraction of light transmitted through that specific window after accounting for shading from overhangs and fins.	Building sketches with dimensions and Survey Form and photographs or

	For details on how to calculate the transmission factor, see Section 7.5.6: Transmission Correction Factors of iSBEM User Guide.	Architectural drawings with dimensions and Survey Form and photographs.
iSBEM Software Tab: "Building Services > Global and Defaults > Project Building Services"		
Data Entry Item	Guidance	Documentary Evidence
Is the lighting separately metered?	Answering "yes" to this input would require the Assessor to obtain formal confirmation that the lighting is separately metered.	The evidence required in order to answer "Yes" can be met by one of the following <ul style="list-style-type: none"> • Copy of As Built electrical schematics showing meters; • Letter from an electrical contractor advising that he has checked the system in the last 12 months and confirming that it is separately metered.
M&T with alarm for "out of range" values?	The Assessor should ascertain if such a system is installed and that it is functioning.	The evidence required is details of M&T system from operational and maintenance manuals. Assessor should review BMS to ensure that the system is in operation or review records for previous 12 months.
Electricity Power Factor	The default power factor value of <0.9 should be used unless analysis of the recent 12 month's bill data indicates a different value.	Electricity utility bills for 12 month period prior to assessment.
District Heating Parameters	<p>The default value should be used if District Heating is selected as the heat source and there is no documentary evidence to substantiate non-default entries.</p> <p>A non-default value should be used where possible. The Assessor should ascertain the CO₂ emission factor and primary energy factor for district heating which should reflect the average annual efficiency and fuel mix of the whole district heating system. It should include for all the gross efficiencies of heat generating plants, including any CHP generators, any waste heat recovery or heat dumping, the effect of heat losses in distribution (external to the building), the emissions from electricity used for pumping, and any other relevant carbon dioxide emissions.</p>	<p>For existing buildings, a report from the district heating scheme operator, detailing how the CO₂ emission and primary energy factors for the district heating have been derived.</p> <p>The calculations should be based on actual fuel bills over a 1 year period. The CO₂ emission factors and primary energy factors for the fuel(s) used by the district heating system should be taken from SEAI published data.</p> <p>For new buildings, a report from the design team, detailing how the CO₂ emission and primary energy factors for the district heating have been derived.</p> <p>The calculations should be based on predicted fuel consumption over a 1 year period. The CO₂ emission factors</p>

		and primary energy factors for the fuel(s) used by the district heating system should be taken from SEAI published data.
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iSBEM Software Tab: "Building Services > HVAC Systems > General"		
Data Entry Item	Guidance	Documentary Evidence
Type	<p>Select from the Building Services Type options in Database for Building Services. Follow guidance in Section 7.6.2 of the iSBEM User Guide.</p> <p>Categorising the HVAC system is an important aspect of BER production because such systems account for the major proportion of energy used in a building.</p> <p>The Assessor must be familiar with the various types of HVAC system as categorised in Table 13 of the iSBEM User Guide.</p> <p>The Assessor must be capable of categorising the system based on the limited information available on site.</p>	<p>In conjunction with the plantroom survey details and ceiling void details the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of air handling units, ducting, associated equipment in ceiling voids, heater/cooling batteries, fresh air intakes, discharge grilles, actuated dampers, etc; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications. <p>The basis for categorising a system should be documented and retained together with supporting information.</p>
Heat Source	Select from the Heating Sources options in the database	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of heat source plant (eg boiler nameplates and manufacturer name); • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Fuel Type	Select from the Fuel Types	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of heat source plant (eg boiler nameplates and manufacturer name); • Copies of technical data sheets from operational and maintenance

		<p>manuals;</p> <ul style="list-style-type: none"> As built drawings and specifications.
Tick if this system also uses CHP	The Assessor must ascertain if the heating system derives its heat, or part of it, from a combined heat and power system. When this is ticked in iSBEM, a new tab opens, "CHP generator".	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of CHP plant with nameplates and manufacturer name; Copies of technical data sheets from operational and maintenance manuals; As built drawings and specifications.
Cooling System Generator Type	Select from the Generator Types options in the database.	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of cooling plant (eg chiller nameplates and manufacturer name); Copies of technical data sheets from operational and maintenance manuals; As built drawings and specifications.
Ventilation Heat Recovery	<p>The heat recovery system may be incorporated within the air handling unit(s) or it may be external.</p> <p>The Assessor must establish whether or not heat recovery is fitted and to make reasonable efforts to ascertain its seasonal efficiency.</p> <p>The default value should be used for efficiency if there is no documentary evidence to substantiate non-default entries.</p> <p>A non-default value should be used where possible. Non-default efficiency values should be in compliance with Section 10.5 of "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of heat recovery unit; Copies of technical data sheets from operational and maintenance manuals; As Built drawings and specifications.

iSBEM Software Tab: “Building Services > HVAC Systems > Heating”		
Data Entry Item	Guidance	Documentary Evidence
Does it qualify for ECA/ACA?	Check the equipment concerned at http://www.SEAI.ie/Your_Business/Accelerated_Capital_Allowance or http://www.eca.gov.uk/ .	Take note of the equipment and details on ACA webpage (or ECA, the UK equivalent).
Do you know the effective heat generating seasonal efficiency?	<p>It is important to note that there is a difference between the “as tested” efficiency of a boiler, the “gross seasonal” efficiency and the “Effective Heat Generating Seasonal Efficiency” as required in iSBEM.</p> <p>Non-default efficiency values should be calculated in compliance with “Non-Domestic Building Services Compliance Guide: 2010” published by CLG in the UK.</p> <p>Refer to Appendix 5 of this Survey Guide for example of how the Compliance Guide should be used.</p> <p>Heating efficiency credits are applied to the “Seasonal Boiler Efficiency” to arrive at the “Effective Heat Generating Seasonal Efficiency” as called for in the iSBEM input screen. Assessors should refer to the Non-Domestic Building Services Compliance Guide: 2010 to determine if credits apply to the efficiency of the system as installed in the building being assessed.</p> <p>Non-default efficiencies may be obtained from manufacturer’s data demonstrating compliance with relevant standards.</p> <p>The Assessor should use default values only if it was not possible to obtain the heating source efficiency data required and should have evidence to substantiate this, such as correspondence from heating source manufacturer stating that efficiency is not available.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of heat source plant (eg boiler nameplates and manufacturer name) and manufacturer’s data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications; • Copies of control specifications/schedules or historical data from BMS demonstrating that the boiler is operating in condensing mode for 80% of the annual operating hours.
Do you know the generator radiant	For radiant heaters the Heat Generator Seasonal Efficiency is equivalent to its thermal efficiency	In conjunction with the plantroom survey details, the evidence required

iSBEM Software Tab: “Building Services > HVAC Systems > Heating”		
Data Entry Item	Guidance	Documentary Evidence
efficiency?	(gross calorific value basis). For flued appliances the thermal efficiency of the radiant heater will be stated by the manufacturer of the radiant heater having been measured according to the test standards EN 1020 or EN 13842 as applicable. The procedures in EN 1020 and EN 13842 yield a net efficiency - this must be converted to a gross efficiency.	can be met by one of the following: <ul style="list-style-type: none"> • Photographs of heat source plant(eg boiler nameplates and manufacturer name) and manufacturer’s data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Tick if this HVAC system uses variable speed pumps.	The Assessor must examine the circulating pumps to determine if they are variable speed type. Manufacturer’s data sheets should assist in this regard.	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of pumps and manufacturer’s data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Tick if this system also uses CHP	Refer to previous section “Building Services > HVAC Systems > General”	Refer to previous section “Building Services > HVAC Systems > General”

iSBEM Software Tab: “Building Services > HVAC Systems > Cooling”		
Data Entry Item	Guidance	Documentary Evidence
Generator kW	Select the cooling generator nominal electrical power.	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of cooling plant (eg chiller nameplates and manufacturer name) and manufacturer’s data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

Fuel Type	Select from the Fuel Types	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of cooling plant (eg chiller nameplates and manufacturer name) and manufacturer's data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Does it qualify for ACA or ECA?	<p>Check the equipment concerned at http://www.SEAi.ie/Your Business/Accelerated Capital Allowance or http://www.eca.gov.uk.</p>	Take note of the equipment and details on ACA/ECA webpage
Do you know the generator seasonal energy efficiency ratio (SEER)?	<p>Non-default efficiency values should be calculated in compliance with "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK.</p> <p>Refer to Appendix 5 of this Survey Guide for example of how the Compliance Guide should be used.</p> <p>Non-default efficiencies may be obtained from manufacturer's data demonstrating compliance with relevant standards.</p> <p>The Assessor should use default values only if it was not possible to obtain the cooling plant efficiency data required and should have evidence to substantiate this, such as correspondence from chiller manufacturer stating that efficiency is not available.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of cooling plant (eg chiller nameplates and manufacturer name) and manufacturer's data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Do you know the generator nominal energy efficiency ratio (EER)?	<p>The methodology for the calculation of the EER is detailed in the "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK.</p> <p>Please note that in this guide the term "Energy Efficiency Ratio (EER)" has the same meaning as the "Nominal Energy Efficiency Ratio (EER)" used in iSBEM.</p> <p>The Assessor should use default values only if it was not possible to obtain the cooling plant efficiency data required and should have evidence to substantiate this, such as correspondence from chiller manufacturer stating that efficiency is not available.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of cooling plant (eg chiller nameplates and manufacturer name) and manufacturer's data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

iSBEM Software Tab: "Building Services > HVAC Systems > System Adjustment"		
Data Entry Item	Guidance	Documentary Evidence
Has the ductwork been leakage tested?	Answering "yes" to this input would require the Assessor to obtain formal confirmation from Building Owner that leakage test has been carried out.	Copy of Test Certificates, test must be carried out to CEN standards.
Does the AHU meet CEN leakage standards?	Answering "yes" to this input would require the Assessor to obtain formal confirmation from Building Owner that leakage test has been carried out.	Copy of Test Certificates, test must be carried out to CEN standards.
Do you know the specific fan power (SFP)?	<p>There is an onus on the Assessor to make reasonable efforts to find and use the fan details and to resort to the default value only if the information is not available.</p> <p>The methodology for the calculation of the SFP is detailed in the "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK.</p>	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of fan nameplates and manufacturer's data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications. <p>Calculations of SFP must be retained as evidence.</p>
Auxiliary energy for fanned warm air heaters	There is an onus on the Assessor to make reasonable efforts to find and use the auxiliary energy details and to resort to the default value only if the information is not available.	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of warm air heaters nameplates and manufacturer's data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

iSBEM Software Tab: "Building Services > HVAC Systems > Metering Provision"		
Data Entry Item	Guidance	Documentary Evidence
Is this HVAC System separately sub-metered?	Answering "yes" to this input would require the Assessor to obtain formal confirmation that the HVAC is separately metered.	<p>The evidence required in order to answer "Yes" can be met by one of the following</p> <ul style="list-style-type: none"> • Copy of As Built electrical schematics showing meters; • Letter from an electrical contractor

		advising that he has checked the system in the last 12 months and confirming that it is separately metered.
M&T with alarm for “out of range” values?	The Assessor should ascertain if such a system is installed and that it is functioning	The evidence required is details of M&T system from operational and maintenance manuals, Assessor should review BMS to ensure that the system is in operation and/or review records for previous 12 months

ISBEM Software Tab: “Building Services > HWS”		
Data Entry Item	Guidance	Documentary Evidence
Generator Type	Select from the Generator Types.	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of HWS plant (eg boiler nameplates and manufacturer name); • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Tick if the generator is later than 1998	Answering “yes” to this input would require the Assessor to obtain documentary evidence to substantiate date of construction of the building or date of any remedial work carried out.	The evidence required can be met by one of the following: <ul style="list-style-type: none"> • Refer to documentary evidence from Age of Building; • Copies of technical data sheets from operational and maintenance manuals; • Photographs of HWS plant nameplates showing year of manufacture; • As Built drawings and specifications.
Fuel Type	Select from the Fuel Types	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of HWS plant (eg

		<p>boiler nameplates and manufacturer name) and manufacturer's data sheet;</p> <ul style="list-style-type: none"> • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Do you know the effective heat generating seasonal efficiency?	<p>Non-default efficiency values should be calculated in compliance with "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK including calculation of heating efficiency credits.</p> <p>The Assessor should use default values only if it was not possible to obtain the HWS plant efficiency data required and should have evidence to substantiate this, such as correspondence from manufacturer stating that efficiency is not available.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of HWS plant(eg boiler nameplates and manufacturer name) and manufacturer's data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Is the system a storage system	<p>The Assessor must ascertain if the HWS system has a storage system. If SES (Solar Energy System) is applied to the Hot Water System it is assumed that hot water storage exists.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of HWS Cylinder and nameplates and manufacturer name; and manufacturer's data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Storage Volume/ Storage Losses	<p>The storage volume, insulation type and thickness are entered if the storage losses are unknown.</p> <p>If no value is entered, iSBEM will use default values. The Assessor should use default values only if it was not possible to obtain the HWS plant data and should have evidence to substantiate this.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of HWS Cylinder and nameplates and manufacturer name and manufacturer's data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and

		<p>specifications.</p> <p>Hot water storage volume measured on site (and evidence of any calculations retained by the Assessor)</p>
Does the System have Secondary Circulation	The Assessor must ascertain if the HWS system has secondary circulation.	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of secondary pipework; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Circulation Losses/ Pump Power/ Loop Length	<p>If no value is entered, iSBEM will use default values</p> <p>The Assessor should use default values only if it was not possible to obtain the HWS plant details and should have evidence to substantiate this.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of HWS pumps and nameplates and manufacturer name and manufacturer's data sheet; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Tick if there is Time Control on Secondary Circulation	The Assessor must ascertain if the HWS system has time control on secondary circulation.	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of secondary time controls; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

iSBEM Software Tab: "Building Services > SES"		
Data Entry Item	Guidance	Documentary Evidence
In HWS	Select from the HWS that the Solar Hot Water Heating Applies.	<p>In conjunction with the external survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Copies of technical data sheets

		<p>from operational and Maintenance Manuals;</p> <ul style="list-style-type: none"> As Built drawings and specifications.
Area	Enter the aperture area of the solar collectors	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Copies of technical data sheets measured in accordance with EN 12975 or data from the HARP database; External survey data on Survey Form with dimensions and orientation and photographs of solar collectors; As Built drawings and specifications.
Orientation	Select from the available options	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> External survey data on Survey Form with dimensions and orientation and photographs of solar collectors. Use a directional compass; As Built drawings and specifications.
Inclination	Select from list of angles between 0° to 90°. 0° tilt represents a horizontal surface 90° tilt represents a vertical surface	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> External survey data on Survey Form with dimensions and inclination and photographs of solar collectors; As Built drawings and specifications.
Do you know the collector performance parameters from EN 12975-2	The default values are used based on the collector selected if it is not possible to obtain the performance parameters for the collector.	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of solar collectors with nameplate and manufacturer's data sheets measured to EN 12975-2 by a body with relevant accreditation or data from the HARP database; Copies of technical data sheets from Operational and Maintenance Manual measured to EN 12975-2 by a body with relevant

		<p>accreditation;</p> <ul style="list-style-type: none"> As Built drawings and specifications.
Solar Storage	<p>The dedicated solar storage volume associated with the solar panel, insulation type and thickness are entered.</p> <p>Refer to Section 7.6.4 of iSBEM User Guide for guidance.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of HWS Cylinders and nameplates and manufacturer name and manufacturer's data sheet; Copies of technical data sheets from operational and maintenance manuals; As Built drawings and specifications. Hot water storage volume measured on site (and evidence of any calculations retained by the Assessor)
Do you know the heat transfer rate of the heat exchanger in the collector loop?	<p>Enter "There is no heat exchanger" if the system is a direct system.</p> <p>Enter "No, use the default" if there is a heat exchanger and it is not possible to obtain the performance data for the heat exchanger.</p> <p>Enter "Yes, value is..." if the value is known.</p> <p>Refer to Section 7.6.4 of iSBEM User Guide for guidance.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of HWS Cylinders and nameplates and manufacturer name and manufacturer's data sheet; Copies of technical data sheets from operational and maintenance manuals; As Built drawings and specifications.
Do you know the overall heat loss coefficient of all pipes in the collector loop?	<p>Enter "No, use the default" if it is not possible to obtain the performance data for the pipework in the collector loop.</p> <p>Enter "Yes, value is" if the value is known.</p> <p>Refer to Section 7.6.4 of iSBEM User Guide for guidance.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following along with provision of representative photographs of the pipework:</p> <ul style="list-style-type: none"> Copies of technical data sheets from operational and maintenance manuals; As Built drawings and specifications.
Are the distribution pipes between the SES and the back-up system insulated?	<p>This only becomes active if there is a separate solar cylinder to the HWS cylinder.</p>	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of pipework;

		<ul style="list-style-type: none"> As Built drawings and specifications.
Auxiliary Energy Consumption	Select from the circulation systems listed in the database.	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of pumps and nameplates and manufacturer name and manufacturer's data sheet; Copies of technical data sheets from operational and maintenance manuals; As Built drawings and specifications.

iSBEM Software Tab: "Building Services > PVS"		
Data Entry Item	Guidance	Documentary Evidence
Type	Select from the list of PV types.	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of PV panels and nameplates and manufacturer name and manufacturer's data sheet; Copies of technical data sheets from operational and maintenance manuals; As Built drawings and specifications.
Area	Enter the Area of the PV	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of Photovoltaics and copies of technical data sheets from manufacturer; Photographs of Photovoltaics and External survey data on Survey Form with dimensions and orientation; As Built drawings and specifications.
Orientation	Select from one of the available options	The evidence required can be met by one of the following:

		<ul style="list-style-type: none"> External survey data on Survey Form with dimensions and orientation with photographs of PV. Use a directional compass; As Built drawings and specifications.
Inclination	Select from list of angles between 0° to 90°. 0° tilt represents a horizontal surface 90° tilt represents a vertical surface	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> External survey data on Survey Form with dimensions and inclination and photographs of PVs; As Built drawings and specifications.

iSBEM Software Tab: "Building Services > Wind Generators"		
Data Entry Item	Guidance	Documentary Evidence
Terrain Type	Select from the list of Terrain types.	<p>In conjunction with the external survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Photographs of surrounding sites; Site plan showing surrounding sites.
Horizontal Axis Diameter	Enter the Diameter of the Wind Turbine	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Copies of technical data sheets from manufacturer; External survey data on Survey Form with dimensions and photographs of wind turbines; As Built drawings and specifications.
Others - Area	Enter the Area Swept by the rotor blades. Refer to Section 7.6.6 of the iSBEM Manual for details	<p>The evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> Copies of technical data sheets from manufacturer; External survey data on Survey Form with dimensions and photographs of wind turbines; As Built drawings and specifications.

Height	Enter the height by the wind turbine. Refer to Section 7.6.6 of the iSBEM Manual for details	The evidence required can be met by one of the following: <ul style="list-style-type: none"> • Copies of technical data sheets from manufacturer; • External survey data on Survey Form with dimensions and photographs of wind turbines; • As Built drawings and specifications.
kW	Enter the wind turbine rated power	The evidence required can be met by one of the following: <ul style="list-style-type: none"> • Copies of technical data sheets from manufacturer and photographs of wind turbines nameplate; • As Built drawings and specifications.

iSBEM Software Tab: "Building Services > CHP generator"

Data Entry Item	Guidance	Documentary Evidence
Fuel Type	Select from the Fuel Types	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of CHP nameplates and manufacturer name and manufacturer's data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Heat Efficiency	Seasonal thermal efficiency of the CHP generator, defined as the total annual useful heat supplied by the generator divided by the total annual fuel energy input to the generator (using the gross calorific value).	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of CHP nameplates and manufacturer name and manufacturer's data sheets in compliance with the national standards or the CHP EU directive or EN 15316-4-4; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

		specifications.
Electrical Efficiency	It is the total annual electric power output by the CHP divided by the total annual fuel energy input (using the gross calorific value).	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of CHP nameplates and manufacturer name and manufacturer's data sheets in compliance with the national standards or the CHP EU directive or EN 15316-4-4; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Building Space Heat Supplied	The Assessor must ascertain the proportion of space heating supplied to the building by the CHP plant.	For existing buildings a report from the Building Operator detailing the proportion of space heating supplied to the building by the CHP plant. Where submetering of the heat is unavailable, the report should be based on actual fuel consumption converted into heat consumption based on the actual plant performances for a 12 month period. For new buildings, a report signed by engineers from the Design Team, detailing the predicted proportion of space heating supplied by the CHP plant.
Building Hot Water Supplied	The Assessor must ascertain the proportion of hot water heating supplied to the building by the CHP plant.	For existing buildings, a report from the Building Operator detailing the proportion of hot water supplied to the building by the CHP plant. Where submetering of the hot water is unavailable, the report should be based on actual fuel consumption converted into hot water consumption based on the actual plant performances for a 12 month period. For new buildings, a report signed by engineers from the Design Team, detailing the predicted proportion of hot water supplied by the CHP plant.

Tick this box for Trigeneration systems	The Assessor must ascertain if the building has a Trigeneration system.	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of CHP nameplates and manufacturer name and photographs of cooling System (absorption chiller nameplate); • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Building Cooling Supplied	The Assessor must ascertain the proportion of cooling supplied to the building by the Trigeneration system	<p>For existing buildings, a report from the Building Operator detailing the proportion of cooling supplied to the building by the Trigeneration.</p> <p>Where submetering of the chilled water is unavailable, the report should be based on running time for the plant over a 12 month period and the actual plant performances.</p> <p>For new buildings, a report signed by engineers from the Design Team, detailing the predicted proportion of space cooling supplied by the CHP.</p>
Chiller Efficiency	The seasonal chiller efficiency of the generator, defined as the cooling demand divided by the cooling energy for the generator.	<p>In conjunction with the plantroom survey details, the evidence required can be met by one of the following:</p> <ul style="list-style-type: none"> • Photographs of CHP nameplates and manufacturer name and photographs of cooling System (absorption chiller nameplate) and manufacturer's data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

iSBEM Software Tab: "Building Services > Zones > Ventilation"		
Data Entry Item	Guidance	Documentary Evidence
Zonal Ventilation Type	If not previously included in the HVAC system, the Assessor may select "Natural" or "Mechanical Supply/Extract" to a zone.	In conjunction with the floor by floor sketches, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • As Built mechanical drawings marked up to show zones; • Survey Form and photographs.
Do you know the Supply/ Extract SFP?	There is an onus on the Assessor to make reasonable efforts to find and use the fan details and to resort to the default value only if the information is not available. Non-default values should be in compliance with Section 10.5 of " Non-Domestic Building Services Compliance Guide: 2010 " published by CLG in the UK	The evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of fan nameplates and manufacturer's data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications. Calculations of SFP must be retained in all cases.
Does activity require high pressure drop air treatment	The Assessor must ascertain if high pressure drop air treatment is required or alternatively use the default based on selected activity.	If non-default values are used the Assessor must obtain drawings and specification showing high pressure drop air treatment.
Ventilation Heat Recovery	The heat recovery system may be incorporated within the air handling unit(s) or it may be external. The Assessor must establish whether or not heat recovery is fitted and to make reasonable efforts to ascertain its seasonal efficiency. The default value should be used for efficiency if there is no documentary evidence to substantiate non-default entries. A non-default value should be used where possible. Non-default values should be in compliance with Section 10.5 of " Non-Domestic Building Services Compliance Guide: 2010 " published by CLG in the UK	In conjunction with the plantroom survey details, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • Photographs of heat recovery unit and manufacturer's data sheets; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

iSBEM Software Tab: "Building Services > Zones > Exhaust"		
Data Entry Item	Guidance	Documentary Evidence
Is there local mechanical exhaust in the zone	The Assessor must ascertain if there is mechanical exhaust from a zone	In conjunction with the floor by floor sketches, the evidence required can be met by one of the following: <ul style="list-style-type: none"> As Built mechanical drawings marked up to show zones; Survey Form and photographs.
Local Mechanical Exhaust	The Assessor must determine the l/s/m ² floor area. Default values can be obtained from CIBSE Guide F Part A.	In conjunction with the floor by floor sketches, the evidence required can be met by one of the following: <ul style="list-style-type: none"> As Built mechanical drawings marked up to show zones; Photos of fan nameplates showing Model No & Flow rate; Survey Form and photographs.
Do you know the Supply/ Extract SFP?	There is an onus on the Assessor to make reasonable efforts to find and use the fan details and to resort to the default value only if the information is not available. Non-default values should be in compliance with Section 10.5 of " Non-Domestic Building Services Compliance Guide: 2010 " published by CLG in the UK	The evidence required can be met by one of the following: <ul style="list-style-type: none"> Photographs of fan nameplates and manufacturer's data sheets; Copies of technical data sheets from operational and maintenance manuals; As Built drawings and specifications. Calculations of SFP must be retained in all cases.

iSBEM Software Tab: "Building Services > Zones > Lighting"		
Data Entry Item	Guidance	Documentary Evidence
What information is available on Lighting	The default value of lighting parameters not available is selected when there is no documentary evidence to substantiate the Full Lighting Design Carried out entry.	In order to use the Full Lighting Design Carried Out entry the Assessor must have a signed statement from a partner/director of the consultants (normally the M&E engineers) responsible for the lighting design showing the installed power and design illuminance for each of the zones.
Lighting Parameters not available	The Assessor must determine the lamp type for each zone.	In conjunction with the floor by floor sketches, the evidence required can be

	Assessors should refer to Appendix 4 for the details on how Shell and Core building should be dealt with.	met by one of the following: <ul style="list-style-type: none"> • As Built Electrical Lighting Drawings marked up to show zones; • Survey Form and photographs of light fittings. Photograph of each light type should be provided.
Are air extracting luminaires fitted	The Assessor must determine if air extracting luminaires are fitted.	In conjunction with the floor by floor sketches, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • As Built Electrical Lighting Drawings marked up to show zones; • Survey Form and photographs of light fittings.

iSBEM Software Tab: “Building Services > Zones > Lighting Controls”		
Data Entry Item	Guidance	Documentary Evidence
Lighting Controls	The Assessor must determine the lighting controls within the zone.	In conjunction with the floor by floor sketches, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • As Built Electrical Lighting Drawings marked up to show zones; • Survey Form and photographs of lighting controls.
Photoelectric Options	The Assessor must determine the type of switching, whether a different sensor controls the back of the zone, the type of sensor and the Parasitic Power of the sensor. Refer to Section 7.6.8 of the iSBEM User Guide.	In conjunction with the floor by floor sketches, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • As Built electrical lighting drawings and specification marked up to show zones; • Survey Form and photographs of lighting controls; • Technical data sheets on the lighting controls from the operational and maintenance manuals.
Occupancy Sensing	The Assessor must determine the type of Occupancy Sensing Controls and the Parasitic Power of the sensor Refer to Section 7.6.8 of the iSBEM User Guide	In conjunction with the floor by floor sketches, the evidence required can be met by one of the following: <ul style="list-style-type: none"> • As Built electrical lighting drawings and specification marked up to

		<p>show zones;</p> <ul style="list-style-type: none">• Survey Form and photographs of lighting controls;• Technical data sheets on the lighting controls from the operational and maintenance manuals.
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Appendix 1: The NEAP Survey Form

NEAP for NEW-FINAL and EXISTING BUILDINGS SURVEY FORM			
Name: _____		Assessor / BER reg. no. _____	
Address: _____		Survey Date: _____	
MPRN		Building Type _____	
Age: Building <input type="checkbox"/> pre 1900 <input type="checkbox"/> post 2009 <input type="checkbox"/> 1900 - 1929 <input type="checkbox"/> 1930 - 1949 <input type="checkbox"/> 1950 - 1966 <input type="checkbox"/> 1967 - 1977 <input type="checkbox"/> 1978 - 1982 <input type="checkbox"/> 1983 - 1993 <input type="checkbox"/> 1994 - 1999 <input type="checkbox"/> 2000 - 2004 <input type="checkbox"/> 2005 - 2007 <input type="checkbox"/> 2008 - 2009	Age: Extension 1 <input type="checkbox"/> pre 1900 <input type="checkbox"/> post 2009 <input type="checkbox"/> 1900 - 1929 <input type="checkbox"/> no extension 1 <input type="checkbox"/> 1930 - 1949 <input type="checkbox"/> 1950 - 1966 <input type="checkbox"/> 1967 - 1977 <input type="checkbox"/> 1978 - 1982 <input type="checkbox"/> 1983 - 1993 <input type="checkbox"/> 1994 - 1999 <input type="checkbox"/> 2000 - 2004 <input type="checkbox"/> 2005 - 2007 <input type="checkbox"/> 2008 - 2009	Age: Extension 2 <input type="checkbox"/> pre 1900 <input type="checkbox"/> post 2009 <input type="checkbox"/> 1900 - 1929 <input type="checkbox"/> no extension 2 <input type="checkbox"/> 1930 - 1949 <input type="checkbox"/> 1950 - 1966 <input type="checkbox"/> 1967 - 1977 <input type="checkbox"/> 1978 - 1982 <input type="checkbox"/> 1983 - 1993 <input type="checkbox"/> 1994 - 1999 <input type="checkbox"/> 2000 - 2004 <input type="checkbox"/> 2005 - 2007 <input type="checkbox"/> 2008 - 2009	number of storeys <input style="width: 40px;" type="text"/> Type of Rating <input type="checkbox"/> new-final building <input type="checkbox"/> existing building
Wall construction Main Wall* <input type="checkbox"/> Cast In-Situ Concrete <input type="checkbox"/> Cavity Wall, bricks/ blocks <input type="checkbox"/> Framed/ Curtain Walling <input type="checkbox"/> Metal Cladding System <input type="checkbox"/> Pre Cast Concrete Panels <input type="checkbox"/> Rubble Construction <input type="checkbox"/> Timber frame <input type="checkbox"/> Solid brick or block wall on insitu concrete <input type="checkbox"/> Weather boarding and tile hung wall <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Roof Construction: Main Roof* <input type="checkbox"/> flat roofs asphalt on precast or in-situ concrete slab <input type="checkbox"/> flat roofs asphalt on metal decking on steel frame <input type="checkbox"/> flat roofs chippings and roofing felt on woodwool or metal decking <input type="checkbox"/> metal cladding system <input type="checkbox"/> pitched roofs asbestos cement (or similar) profiled cladding <input type="checkbox"/> pitched roofs coated profiled metal (steel or aluminium) cladding <input type="checkbox"/> pitched roofs tile, slate and similar covering <input type="checkbox"/> room in roof <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Ground Floor Construction: Main Floor* <input type="checkbox"/> separating floor <input type="checkbox"/> solid ground floor <input type="checkbox"/> suspended ground floor <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated Ground Floor Construction: Floor Type 2* <input type="checkbox"/> separating floor <input type="checkbox"/> solid ground floor <input type="checkbox"/> suspended ground floor <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	
Wall construction Wall Type 2* <input type="checkbox"/> Cast In-Situ Concrete <input type="checkbox"/> Cavity Wall, bricks/ blocks <input type="checkbox"/> Framed/ Curtain Walling <input type="checkbox"/> Metal Cladding System <input type="checkbox"/> Pre Cast Concrete Panels <input type="checkbox"/> Rubble Construction <input type="checkbox"/> Timber frame <input type="checkbox"/> Solid brick or block wall on insitu concrete <input type="checkbox"/> Weather boarding and tile hung wall <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Roof Construction: Roof Type 2* <input type="checkbox"/> flat roofs asphalt on precast or in-situ concrete slab <input type="checkbox"/> flat roofs asphalt on metal decking on steel frame <input type="checkbox"/> flat roofs chippings and roofing felt on woodwool or metal decking <input type="checkbox"/> metal cladding system <input type="checkbox"/> pitched roofs asbestos cement (or similar) profiled cladding <input type="checkbox"/> pitched roofs coated profiled metal (steel or aluminium) cladding <input type="checkbox"/> pitched roofs tile, slate and similar covering <input type="checkbox"/> room in roof <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Ground Floor Construction: Floor Type 3* <input type="checkbox"/> separating floor <input type="checkbox"/> solid ground floor <input type="checkbox"/> suspended ground floor <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated Ground Floor Construction: Floor Type 4* <input type="checkbox"/> separating floor <input type="checkbox"/> solid ground floor <input type="checkbox"/> suspended ground floor <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	
Wall construction Wall Type 3* <input type="checkbox"/> Cast In-Situ Concrete <input type="checkbox"/> Cavity Wall, bricks/ blocks <input type="checkbox"/> Framed/ Curtain Walling <input type="checkbox"/> Metal Cladding System <input type="checkbox"/> Pre Cast Concrete Panels <input type="checkbox"/> Rubble Construction <input type="checkbox"/> Timber frame <input type="checkbox"/> Solid brick or block wall on insitu concrete <input type="checkbox"/> Weather boarding and tile hung wall <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Roof Construction: Roof Type 3* <input type="checkbox"/> flat roofs asphalt on precast or in-situ concrete slab <input type="checkbox"/> flat roofs asphalt on metal decking on steel frame <input type="checkbox"/> flat roofs chippings and roofing felt on woodwool or metal decking <input type="checkbox"/> metal cladding system <input type="checkbox"/> pitched roofs asbestos cement (or similar) profiled cladding <input type="checkbox"/> pitched roofs coated profiled metal (steel or aluminium) cladding <input type="checkbox"/> pitched roofs tile, slate and similar covering <input type="checkbox"/> room in roof <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Door Construction: Main Door* <input type="checkbox"/> vehicle access door <input type="checkbox"/> personnel door <input type="checkbox"/> Non Default U value Door Construction: Door Type 2* <input type="checkbox"/> vehicle access door <input type="checkbox"/> personnel door <input type="checkbox"/> Non Default U value	
Wall construction Wall Type 4* <input type="checkbox"/> Cast In-Situ Concrete <input type="checkbox"/> Cavity Wall, bricks/ blocks <input type="checkbox"/> Framed/ Curtain Walling <input type="checkbox"/> Metal Cladding System <input type="checkbox"/> Pre Cast Concrete Panels <input type="checkbox"/> Rubble Construction <input type="checkbox"/> Timber frame <input type="checkbox"/> Solid brick or block wall on insitu concrete <input type="checkbox"/> Weather boarding and tile hung wall <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Roof Construction: Roof Type 4* <input type="checkbox"/> flat roofs asphalt on precast or in-situ concrete slab <input type="checkbox"/> flat roofs asphalt on metal decking on steel frame <input type="checkbox"/> flat roofs chippings and roofing felt on woodwool or metal decking <input type="checkbox"/> metal cladding system <input type="checkbox"/> pitched roofs asbestos cement (or similar) profiled cladding <input type="checkbox"/> pitched roofs coated profiled metal (steel or aluminium) cladding <input type="checkbox"/> pitched roofs tile, slate and similar covering <input type="checkbox"/> room in roof <input type="checkbox"/> Non Default U value <input type="checkbox"/> Uninsulated	Door Construction: Door Type 3* <input type="checkbox"/> vehicle access door <input type="checkbox"/> personnel door <input type="checkbox"/> Non Default U value Door Construction: Door Type 4* <input type="checkbox"/> vehicle access door <input type="checkbox"/> personnel door <input type="checkbox"/> Non Default U value	
<i>*note: Actual U-value should be calculated and used if the wall /roof /floor construction detail is available on site or through documentation. Substantiation supporting the U-value calculation is required. Non default U values should be recorded along with relevant calculation in Assessor's records. Reprint this page as often as required (e.g. Multiple extensions or more than four wall types etc)</i>			

HVAC System (general information)				
MAIN HVAC SYSTEM				
HVAC System	Heating System Fuel		Heating Source	
<input type="checkbox"/> Central heating using water: radiators <input type="checkbox"/> Central heating using water: convectors <input type="checkbox"/> Central heating using water: floor heating <input type="checkbox"/> Central heating using air distribution <input type="checkbox"/> Other local room heater - fanned <input type="checkbox"/> Other local room heater - unfanned <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Flued radiant heater <input type="checkbox"/> Multiburner radiant heaters <input type="checkbox"/> Flued forced-convection air heaters <input type="checkbox"/> Unflued forced-convection air heaters <input type="checkbox"/> Single-duct VAV <input type="checkbox"/> Dual-duct VAV <input type="checkbox"/> Indoor packaged cabinet (VAV) <input type="checkbox"/> Fan coil systems <input type="checkbox"/> Induction system <input type="checkbox"/> Constant volume system (fixed fresh air rate) <input type="checkbox"/> Constant volume system (variable fresh air rate) <input type="checkbox"/> Multizone (hot deck/cold deck) <input type="checkbox"/> Terminal reheat (constant volume) <input type="checkbox"/> Dual duct (constant volume) <input type="checkbox"/> Chilled ceilings or passive chilled beams and displacement ventilation <input type="checkbox"/> Active chilled beams <input type="checkbox"/> Water loop heat pump <input type="checkbox"/> Split or multi-split system <input type="checkbox"/> Single room cooling system <input type="checkbox"/> Eligible for ECA/ACA? <input type="checkbox"/> None	<input type="checkbox"/> mains gas <input type="checkbox"/> biomass <input type="checkbox"/> LPG <input type="checkbox"/> waste heat <input type="checkbox"/> Biogas <input type="checkbox"/> Anthracite <input type="checkbox"/> Oil <input type="checkbox"/> Smokeless Fuel <input type="checkbox"/> electricity <input type="checkbox"/> Dual Fuel Appliances <input type="checkbox"/> Coal <input type="checkbox"/> other: _____		<input type="checkbox"/> LTHW Boiler <input type="checkbox"/> Unitary radiant heater <input type="checkbox"/> MTHW boiler <input type="checkbox"/> Radiant heater <input type="checkbox"/> HTHW boiler <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Direct or storage electric heater <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): air source <input type="checkbox"/> Direct gas firing <input type="checkbox"/> Heat pump (electric): air source <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): ground/water <input type="checkbox"/> Unflued gas warm air heater <input type="checkbox"/> Heat pump (electric): ground/water <input type="checkbox"/> Air heater <input type="checkbox"/> District heating	
Heating System: other info				
<input type="checkbox"/> HVAC system uses Variable Speed Pumps <input type="checkbox"/> System also uses CHP				
Heating System Age		Heating System Efficiency		Manufacturer / make / model number
<input type="checkbox"/> 1998 or later <input type="checkbox"/> pre 1998		<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
Cooling System Fuel		Cooling Source		
<input type="checkbox"/> mains gas <input type="checkbox"/> electricity <input type="checkbox"/> LPG <input type="checkbox"/> Oil <input type="checkbox"/> Biogas		<input type="checkbox"/> Air cooled chiller Size: _____ kW <input type="checkbox"/> Water cooled chiller Size: _____ kW <input type="checkbox"/> Remote-condenser chiller Size: _____ kW <input type="checkbox"/> Heat pump (gas/oil) <input type="checkbox"/> Heat pump (electric)		
Mixed Mode Operation		Cooling System Efficiency		Manufacturer / make / model number
<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
Ventilation Heat Recovery				Heat Recovery Seasonal Efficiency
<input type="checkbox"/> Plate heat exchanger (Recuperator) <input type="checkbox"/> Thermal wheel <input type="checkbox"/> Heat-pipes <input type="checkbox"/> Run around coil				<input type="checkbox"/> Default <input type="checkbox"/> Non Default; Efficiency: _____
Ductwork Leakage		AHU Leakage	Specific Fan Power	Aux Energy
<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____		<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default SFP: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default kWh/kWh: _____
HVAC Metering Provision			Lighting Metering Provision	
<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm			<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm	
HVAC SYSTEM TYPE 2				
HVAC System	Heating System Fuel		Heating Source	
<input type="checkbox"/> Central heating using water: radiators <input type="checkbox"/> Central heating using water: convectors <input type="checkbox"/> Central heating using water: floor heating <input type="checkbox"/> Central heating using air distribution <input type="checkbox"/> Other local room heater - fanned <input type="checkbox"/> Other local room heater - unfanned <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Flued radiant heater <input type="checkbox"/> Multiburner radiant heaters <input type="checkbox"/> Flued forced-convection air heaters <input type="checkbox"/> Unflued forced-convection air heaters <input type="checkbox"/> Single-duct VAV <input type="checkbox"/> Dual-duct VAV <input type="checkbox"/> Indoor packaged cabinet (VAV) <input type="checkbox"/> Fan coil systems <input type="checkbox"/> Induction system <input type="checkbox"/> Constant volume system (fixed fresh air rate) <input type="checkbox"/> Constant volume system (variable fresh air rate) <input type="checkbox"/> Multizone (hot deck/cold deck) <input type="checkbox"/> Terminal reheat (constant volume) <input type="checkbox"/> Dual duct (constant volume) <input type="checkbox"/> Chilled ceilings or passive chilled beams and displacement ventilation <input type="checkbox"/> Active chilled beams <input type="checkbox"/> Water loop heat pump <input type="checkbox"/> Split or multi-split system <input type="checkbox"/> Single room cooling system <input type="checkbox"/> Eligible for ECA/ACA? <input type="checkbox"/> None	<input type="checkbox"/> mains gas <input type="checkbox"/> biomass <input type="checkbox"/> LPG <input type="checkbox"/> waste heat <input type="checkbox"/> Biogas <input type="checkbox"/> Anthracite <input type="checkbox"/> Oil <input type="checkbox"/> Smokeless Fuel <input type="checkbox"/> electricity <input type="checkbox"/> Dual Fuel Appliances <input type="checkbox"/> Coal <input type="checkbox"/> other: _____		<input type="checkbox"/> LTHW Boiler <input type="checkbox"/> Unitary radiant heater <input type="checkbox"/> MTHW boiler <input type="checkbox"/> Radiant heater <input type="checkbox"/> HTHW boiler <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Direct or storage electric heater <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): air source <input type="checkbox"/> Direct gas firing <input type="checkbox"/> Heat pump (electric): air source <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): ground/water <input type="checkbox"/> Unflued gas warm air heater <input type="checkbox"/> Heat pump (electric): ground/water <input type="checkbox"/> Air heater <input type="checkbox"/> District heating	
Heating System: other info				
<input type="checkbox"/> HVAC system uses Variable Speed Pumps <input type="checkbox"/> System also uses CHP				
Heating System Age		Heating System Efficiency		Manufacturer / make / model number
<input type="checkbox"/> 1998 or later <input type="checkbox"/> pre 1998		<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
Cooling System Fuel		Cooling Source		
<input type="checkbox"/> mains gas <input type="checkbox"/> electricity <input type="checkbox"/> LPG <input type="checkbox"/> Oil <input type="checkbox"/> Biogas		<input type="checkbox"/> Air cooled chiller Size: _____ kW <input type="checkbox"/> Water cooled chiller Size: _____ kW <input type="checkbox"/> Remote-condenser chiller Size: _____ kW <input type="checkbox"/> Heat pump (gas/oil) <input type="checkbox"/> Heat pump (electric)		
Mixed Mode Operation		Cooling System Efficiency		Manufacturer / make / model number
<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
Ventilation Heat Recovery				Heat Recovery Seasonal Efficiency
<input type="checkbox"/> Plate heat exchanger (Recuperator) <input type="checkbox"/> Thermal wheel <input type="checkbox"/> Heat-pipes <input type="checkbox"/> Run around coil				<input type="checkbox"/> Default <input type="checkbox"/> Non Default; Efficiency: _____
Ductwork Leakage		AHU Leakage	Specific Fan Power	Aux Energy
<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____		<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default SFP: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default kWh/kWh: _____
HVAC Metering Provision			Lighting Metering Provision	
<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm			<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm	

HVAC System (general information)				
HVAC SYSTEM TYPE 3				
HVAC System <input type="checkbox"/> Central heating using water: radiators <input type="checkbox"/> Central heating using water: convectors <input type="checkbox"/> Central heating using water: floor heating <input type="checkbox"/> Central heating using air distribution <input type="checkbox"/> Other local room heater - fanned <input type="checkbox"/> Other local room heater - unfanned <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Flued radiant heater <input type="checkbox"/> Multiburner radiant heaters <input type="checkbox"/> Flued forced-convection air heaters <input type="checkbox"/> Unflued forced-convection air heaters <input type="checkbox"/> Single-duct VAV <input type="checkbox"/> Dual-duct VAV <input type="checkbox"/> Indoor packaged cabinet (VAV) <input type="checkbox"/> Fan coil systems <input type="checkbox"/> Induction system <input type="checkbox"/> Constant volume system (fixed fresh air rate) <input type="checkbox"/> Constant volume system (variable fresh air rate) <input type="checkbox"/> Multizone (hot deck/cold deck) <input type="checkbox"/> Terminal reheat (constant volume) <input type="checkbox"/> Dual duct (constant volume) <input type="checkbox"/> Chilled ceilings or passive chilled beams and displacement ventilation <input type="checkbox"/> Active chilled beams <input type="checkbox"/> Water loop heat pump <input type="checkbox"/> Split or multi-split system <input type="checkbox"/> Single room cooling system <input type="checkbox"/> Eligible for ECA/ACA? <input type="checkbox"/> None	Heating System Fuel <input type="checkbox"/> mains gas <input type="checkbox"/> biomass <input type="checkbox"/> LPG <input type="checkbox"/> waste heat <input type="checkbox"/> Biogas <input type="checkbox"/> Anthracite <input type="checkbox"/> Oil <input type="checkbox"/> Smokeless Fuel <input type="checkbox"/> electricity <input type="checkbox"/> Dual Fuel Appliances <input type="checkbox"/> Coal <input type="checkbox"/> other: Heating System: other info <input type="checkbox"/> HVAC system uses Variable Speed Pumps <input type="checkbox"/> System also uses CHP		Heating Source <input type="checkbox"/> LTHW Boiler <input type="checkbox"/> Unitary radiant heater <input type="checkbox"/> MTHW boiler <input type="checkbox"/> Radiant heater <input type="checkbox"/> HTHW boiler <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Direct or storage electric heater <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): air source <input type="checkbox"/> Direct gas firing <input type="checkbox"/> Heat pump (electric): air source <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): ground/water <input type="checkbox"/> Unflued gas warm air heater <input type="checkbox"/> Heat pump (electric): ground/water <input type="checkbox"/> Air heater <input type="checkbox"/> District heating	
	Heating System Age	Heating System Efficiency	Manufacturer / make / model number	
	<input type="checkbox"/> 1998 or later <input type="checkbox"/> pre 1998	<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
	Cooling System Fuel <input type="checkbox"/> mains gas <input type="checkbox"/> electricity <input type="checkbox"/> LPG <input type="checkbox"/> Oil <input type="checkbox"/> Biogas		Cooling Source <input type="checkbox"/> Air cooled chiller Size: _____ kW <input type="checkbox"/> Water cooled chiller Size: _____ kW <input type="checkbox"/> Remote-condenser chiller Size: _____ kW <input type="checkbox"/> Heat pump (gas/oil) <input type="checkbox"/> Heat pump (electric)	
	Mixed Mode Operation	Cooling System Efficiency	Manufacturer / make / model number	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
	Ventilation Heat Recovery		Heat Recovery Seasonal Efficiency	
	<input type="checkbox"/> Plate heat exchanger (Recuperator) <input type="checkbox"/> Thermal wheel <input type="checkbox"/> Heat-pipes <input type="checkbox"/> Run around coil		<input type="checkbox"/> Default <input type="checkbox"/> Non Default; Efficiency _____	
	Ductwork Leakage	AHU Leakage	Specific Fan Power	Aux Energy
	<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default SFP: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default kWh/kWh: _____
HVAC Metering Provision		Lighting Metering Provision		
<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm		<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm		
HVAC SYSTEM TYPE 4				
HVAC System <input type="checkbox"/> Central heating using water: radiators <input type="checkbox"/> Central heating using water: convectors <input type="checkbox"/> Central heating using water: floor heating <input type="checkbox"/> Central heating using air distribution <input type="checkbox"/> Other local room heater - fanned <input type="checkbox"/> Other local room heater - unfanned <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Flued radiant heater <input type="checkbox"/> Multiburner radiant heaters <input type="checkbox"/> Flued forced-convection air heaters <input type="checkbox"/> Unflued forced-convection air heaters <input type="checkbox"/> Single-duct VAV <input type="checkbox"/> Dual-duct VAV <input type="checkbox"/> Indoor packaged cabinet (VAV) <input type="checkbox"/> Fan coil systems <input type="checkbox"/> Induction system <input type="checkbox"/> Constant volume system (fixed fresh air rate) <input type="checkbox"/> Constant volume system (variable fresh air rate) <input type="checkbox"/> Multizone (hot deck/cold deck) <input type="checkbox"/> Terminal reheat (constant volume) <input type="checkbox"/> Dual duct (constant volume) <input type="checkbox"/> Chilled ceilings or passive chilled beams and displacement ventilation <input type="checkbox"/> Active chilled beams <input type="checkbox"/> Water loop heat pump <input type="checkbox"/> Split or multi-split system <input type="checkbox"/> Single room cooling system <input type="checkbox"/> Eligible for ECA/ACA? <input type="checkbox"/> None	Heating System Fuel <input type="checkbox"/> mains gas <input type="checkbox"/> biomass <input type="checkbox"/> LPG <input type="checkbox"/> waste heat <input type="checkbox"/> Biogas <input type="checkbox"/> Anthracite <input type="checkbox"/> Oil <input type="checkbox"/> Smokeless Fuel <input type="checkbox"/> electricity <input type="checkbox"/> Dual Fuel Appliances <input type="checkbox"/> Coal <input type="checkbox"/> other: Heating System: other info <input type="checkbox"/> HVAC system uses Variable Speed Pumps <input type="checkbox"/> System also uses CHP		Heating Source <input type="checkbox"/> LTHW Boiler <input type="checkbox"/> Unitary radiant heater <input type="checkbox"/> MTHW boiler <input type="checkbox"/> Radiant heater <input type="checkbox"/> HTHW boiler <input type="checkbox"/> Unflued radiant heater <input type="checkbox"/> Direct or storage electric heater <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): air source <input type="checkbox"/> Direct gas firing <input type="checkbox"/> Heat pump (electric): air source <input type="checkbox"/> Room heater <input type="checkbox"/> Heat pump (gas/oil): ground/water <input type="checkbox"/> Unflued gas warm air heater <input type="checkbox"/> Heat pump (electric): ground/water <input type="checkbox"/> Air heater <input type="checkbox"/> District heating	
	Heating System Age	Heating System Efficiency	Manufacturer / make / model number	
	<input type="checkbox"/> 1998 or later <input type="checkbox"/> pre 1998	<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
	Cooling System Fuel <input type="checkbox"/> mains gas <input type="checkbox"/> electricity <input type="checkbox"/> LPG <input type="checkbox"/> Oil <input type="checkbox"/> Biogas		Cooling Source <input type="checkbox"/> Air cooled chiller Size: _____ kW <input type="checkbox"/> Water cooled chiller Size: _____ kW <input type="checkbox"/> Remote-condenser chiller Size: _____ kW <input type="checkbox"/> Heat pump (gas/oil) <input type="checkbox"/> Heat pump (electric)	
	Mixed Mode Operation	Cooling System Efficiency	Manufacturer / make / model number	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Default <input type="checkbox"/> Non Default		
	Ventilation Heat Recovery		Heat Recovery Seasonal Efficiency	
	<input type="checkbox"/> Plate heat exchanger (Recuperator) <input type="checkbox"/> Thermal wheel <input type="checkbox"/> Heat-pipes <input type="checkbox"/> Run around coil		<input type="checkbox"/> Default <input type="checkbox"/> Non Default; Efficiency _____	
	Ductwork Leakage	AHU Leakage	Specific Fan Power	Aux Energy
	<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default Class: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default SFP: _____	<input type="checkbox"/> Default <input type="checkbox"/> Non Default kWh/kWh: _____
HVAC Metering Provision		Lighting Metering Provision		
<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm		<input type="checkbox"/> Yes, Submetered <input type="checkbox"/> Yes, M&T Alarm <input type="checkbox"/> No, Submetered <input type="checkbox"/> No, M&T Alarm		

Replicate this page as required if there are more than four HVAC systems

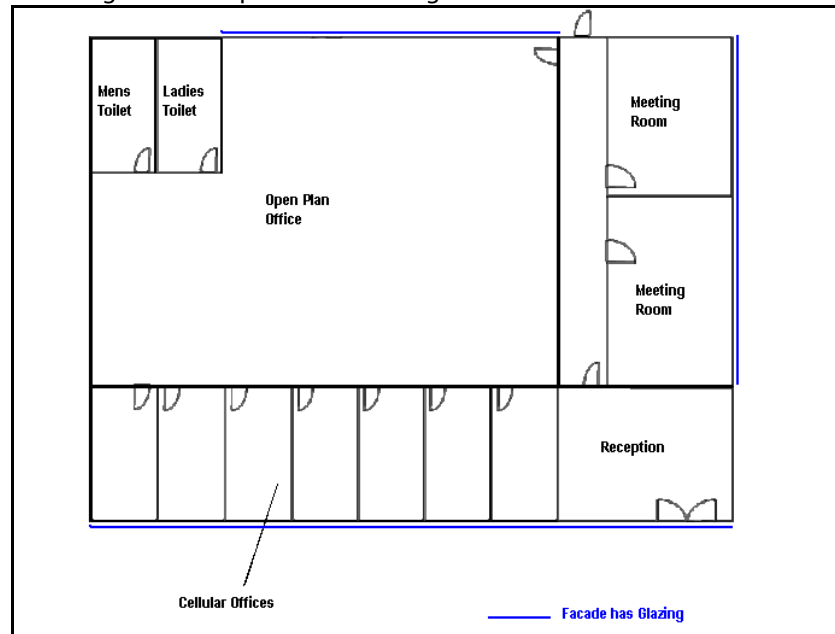
ZONES: GEOMETRICAL DETAILS																									
Adjacent spaces: CAS - Conditioned adjoining space; EW - Exterior; UG - Underground; UH - Unheated; UH - Unheated adjoining space; Shading type: ALC - All other cases; UG - Ext solar protection; UH - Ext solar protection; UH - Ext solar protection with automatic control.																									
Basic zone information				Envelope elements			Windows and doors			Window only			Doors only												
Zone name	Description	Building type	Activity#	Area m2	Height m	Number of rooms	HVAC system	Element name#	Wall roof (flat or roof) floor	Orientation (NESWN)	Adjacent space	Construction name# (or name for SBEM)	Length (m) or area (SBEI)	Area m2	Window frame name#	Glazing (or construction name#)	Area m2	or % glazed (instead of area)	Frame type	Window (or door) type	Gas type	Shading type	Transmission factor	Type of door	
z/1																									
z0'02																									
z0'03																									
z0'04																									

Copy the above format for any further zones; Copy lines in each zone for additional elements. Zones can be merged prior to entry on Survey form (subject to SBEM rules). Survey Form Version 1.0...03/2011

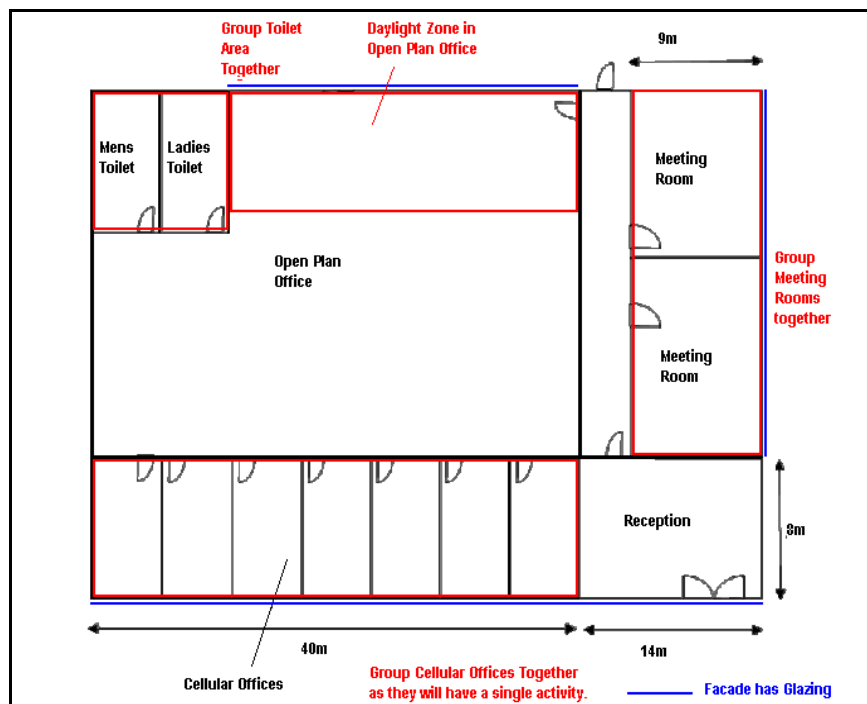
Appendix 2: Zoning Example

Assessors need to be competent in the zoning convention as set out in section 3.3 of the iSBEM User Guide which may help reduce the amount of time and measurement required.

For example; the following is an example office building.



Zoning the building by using the convention set out in the iSBEM user guide can help reduce the number of measurements that need to be taken. The office building can be zoned as follows:



It is important to note that internal envelopes between merged zones which have thermal mass should be included within the model. The k_m value will determine how the building retains and emits heat, and hence they should be defined in iSBEM. You can sum the areas of two or more internal walls (between merged zones) with the same construction and orientation and enter them as one envelope (assigned to the zone resulting from the merging).

If the internal walls are partitions of light construction and very small thermal mass, then they should not cause any significant effects on the calculation.

Appendix 3: List of Activities

Building Types/Activities	Office	primary schools	secondary school	further education universities	primary health care buildings	nursing, residential homes and hostels	hospital	hotel	restaurant/bar/public house	sports centre/leisure centre	sports ground/arena	retail	warehouse and storage	theatres/cinemas/ music halls and auditoria	social clubs	community/day centre	libraries, museums and galleries	prisons	emergency services	crown and county courts	airport terminals	station/train station/seaport terminal	workshops/maintenance depot	telephone exchanges	Industrial process building	Laundry	Dwelling	Retail Warehouse	Miscellaneous 24hr activities	
Cellular office	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
Open plan office	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Storage area	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Circulation (corridors and stairs) (- non public)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Toilets	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Tea making	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Reception	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X	X					
Meeting room	X	X	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X			X			X		
Dry sports hall		X	X	X			X	X		X	X				X	X		X	X											
Changing facilities	X	X	X	X			X	X		X	X	X	X		X	X		X	X										X	
Swimming pool		X	X	X				X		X																				

Appendix 4: Default Data

This section outlines defaults which may be chosen for non-domestic BERs. However, actual data should be used at all times provided acceptable evidence thereof is available.

A4.1 Age of Building

iSBEM Software Tab: "General Information"	
Year of Construction	Relevant Building Regulations -select "uninsulated" option if element uninsulated.
Pre 1994	Pre 1991
1994 to 1999	1992 Building Regulations
2000 to 2004	1997 Building Regulations
2005 to 2007	2002 Building Regulations
2008 to 2009	2006 Building Regulations
Post 2009	2007 Building Regulations

A4.2 Constructional Types

iSBEM Software Tab: "Project Database"	
Data Entry Item	Default Value
Construction for Floors	Select from "Help with Inference procedures" within iSBEM software. If known to be uninsulated, select "uninsulated" option.
Construction for Walls	Select from "Help with Inference procedures" within iSBEM software. If known to be uninsulated, select "uninsulated" option.
Construction for Roofs	Select from "Help with Inference procedures" within iSBEM software. If known to be uninsulated, select "uninsulated" option.
Construction for Doors	Select from "Import One from Library". Age Band: Pre 1997 Regs Personnel Door: Uninsulated Door Age Band: Post 1997 Regs Personnel Door: Insulated Door Age Band: Pre 1997 Regs Vehicle Access Door: Uninsulated Door Age Band: 1997/2002 Regs Vehicle Access Door (IRL): 1997/2002 regs Age Band: 2006 Regs Vehicle Access Door (IRL): 2006 regs Any uninsulated Vehicle Access Door: Select "Vehicle Access Door, uninsulated"

Glazing	<p>The survey process provides information on window area, glazing type, age, frame type and orientation.</p> <p>If the Assessor is unable to determine whether double glazing is Low “E” or not; it can be assumed that double glazing installed before 2004 is not Low E and during or after 2004 is Low “E”.</p> <p>The surveyor must assume that double or triple glazing is air filled unless documentary evidence is provided to substantiate an alternate.</p> <p>The gap between double and triple glazing panes should be assumed as 6mm unless measured as otherwise (accounting for pane thickness of 4mm where necessary).</p>
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A4.3 HVAC System

iSBEM Software Tab: “HVAC”	
Data Entry Item	Default Value
No evidence of a HVAC present	<p>The default HVAC systems for buildings are as follows:</p> <ul style="list-style-type: none"> • 'Heating only - Electric resistance' - Assumed to be electric central heating system with warm air distribution. If you do not know the heating method you should select electric resistance heating as your default. • “Heating only - Other systems’ - Assumed to be wet radiator system, heat generated by fuel combustion. • ‘Heating and mechanical cooling’ - Assumed to be constant volume air system with terminal reheat and fixed fresh air. This is the assumed HVAC system in the absence of other information for conditioned spaces. • If no HVAC system serves a zone (ie an unconditioned zone) select “Zone without HVAC system” <p>For details Refer to 7.5.3 of the iSBEM User Guide.</p>

A4.4 HWS System

iSBEM Software Tab: “HWS”	
Data Entry Item	Default Value
No evidence of a Hot Water System present	<p>Where a fuel (oil/gas) is supplied to the building the HWS System: “Dedicated Hot Water Boiler” should be selected with a fuel type based on fuel supplied to unit.</p> <p>Where no fuel is supplied to the building the HWS System: “Instantaneous Hot Water only” should be selected with a fuel type of “Grid Supplied Electricity”</p> <p>HWS System Storage/ Secondary Circulation Losses: Not present</p>
Hot Water cylinder insulation if not accessible	<p>Pre 1993: No Insulation 1994 to 1999: 25mm Factory Insulated Post 1999: 35mm Factory Insulated</p>

A4.5 SES System

iSBEM Software Tab: "SES"	
Data Entry Item	Default Value
Evidence of solar collector present but data unobtainable	If present, the parameters for the calculation are as follows for each unobtainable item: <ul style="list-style-type: none"> - panel aperture area 3 m² ; - flat panel, glazed; - facing South, pitch 30°; - combined cylinder, solar part one-third of total, or if a combi boiler the cylinder identified is a dedicated solar cylinder. If combined cylinder is accessible, solar storage volume is portion below the coil directly above the solar heated coil.
Gross Area obtained from survey	Aperture Area= Flat Plate Glazed Gross Area x 0.9 Aperture Area= Evacuated Tube Gross Area x 0.72

A4.6 PV System

iSBEM Software Tab: "PVS"	
Data Entry Item	Default Value
Evidence of PV present but data unobtainable	If present, the parameters for the calculation are as follows for each unobtainable item: <ul style="list-style-type: none"> - PV area is roof area for heat loss, times percent of roof area covered by PVs, and if pitched roof divided by $\cos(35^\circ)$; - Type: Amorphous silicon; - facing South, pitch 30°.

A4.7 Wind Turbine

iSBEM Software Tab: "PVS"	
Data Entry Item	Default Value
Evidence of Wind Turbine present but data unobtainable	If present, the parameters for the calculation are as follows for each unobtainable item: <ul style="list-style-type: none"> - Height: Estimate relative to height of building; - Diameter of turbine: Estimate relative to height of turbine; - Terrain Type: Urban with average building height > 15m.

A4.8 Shell and Core Buildings

For shell and core buildings not all of the services will be installed (especially lighting, mechanical ventilation and cooling) at the point where the building is sold or let. Buildings (or parts of) that are let or sold as bare structures, without services at all, will nonetheless require a **Provisional** Building Energy Rating (BER) as there is an expectation that energy will be used to condition the indoor climate.

The Provisional Building Energy Rating should be based on the following:

Data Entry Item	Default Value
Proposed Design Available	Where a proposed mechanical and electrical design is available, the HVAC and lighting system can be based on the mechanical and electrical specifications, schedules and drawings for the shell and core unit.
No Design Available – Electrical Supply Only to Unit	HVAC System: "Terminal reheat (constant volume)" with direct electric heating and air cooled chiller. HWS System: "Instantaneous Hot Water only" should be selected with a fuel type of "Grid Supplied Electricity". HWS System Storage/ Secondary Circulation Losses: Not present. Lighting: Lighting Parameters Not Available; Lamp Type: Don't Know. Lighting Controls: Local Manual Switching.
No Design Available – Electrical and Alternate Fuel (oil/gas etc) Supplied to Unit	HVAC System: "Terminal reheat (constant volume)" with fuel type as available on site for heating. Air cooled chiller used for cooling. HWS System: "Dedicated Hot Water Boiler" should be selected with a fuel type based on fuel supplied to unit HWS System Storage/ Secondary Circulation Losses: Not present Lighting: Lighting Parameters Not Available; Lamp Type: Don't Know Lighting Controls: Local Manual Switching

A4.9 Unheated Buildings

A BER assessment is not required for the following unheated building types:

- an industrial building not intended for human occupancy over extended periods and where the installed heating capacity does not exceed 10 W/m²; or
- a non-residential agricultural building where the installed heating capacity does not exceed 10 W/m²

However if the building is unheated and does not comply with the above guidelines, a BER assessment is required. Currently iSBEM must have a heating system applied to a zone in the building in order for the software to operate.

The assessor should base the heating system on the notional building's heating system and apply it to all zones within the building. For the purpose of this guide, an unheated building is defined as a building that has been fitted out with other services such as lighting, hot water, mechanical ventilation etc but has no heating system installed.

Appendix 5: Non-Domestic Building Services Compliance Guide: 2010 Example.

Assessors need to be competent in the use of the [Non Domestic Building Services Compliance Guide](#). This Compliance Guide outlines how seasonal efficiency should be calculated for various heating and cooling systems in buildings and how credits can be applied to increase the efficiency of different systems. Credits are usually applied based on additional controls installed in the system. Assessors should refer to the Non-Domestic Building Services Compliance Guide to determine if credits apply to the efficiency of the system as installed in the building being assessed.

The following examples demonstrate use of the Compliance Guide in determining seasonal heating efficiency (boilers) and SEER of a chilling system.

Example 1: Building with a Condensing Gas Boiler and Standard Gas Boiler.

Information from Building Survey:

Heating Load: 200kW

	Boiler 1	Boiler 2
kW Rating	150kW	150kW
Fuel Type	Gas	Gas
Stage	Lead	Backup
Boiler Efficiency based on Gross Calorific Value from accredited data	90% at 100% load 96% at 30% load	82% at 100% load 86% at 30% load

Using Table 2 of the Compliance Guide the seasonal efficiency is calculated as follows:

Boiler No	Rating kW	Boiler % efficiency at boiler outputs of		Boiler % output at system outputs of			Boiler % efficiency at system outputs of		
		100%	30%	15%	30%	100%	15%	30%	100%
1									
2									
3									
System efficiency at part load									
Weighting factor							0.36	0.45	0.19
Overall seasonal boiler efficiency									

Boiler No	Rating kW	Boiler % efficiency at boiler outputs of		Boiler % output at system outputs of			Boiler % efficiency at system outputs of		
		100%	30%	15%	30%	100%	15%	30%	100%
1	150	90	96	20% ¹	40%	100%	96.9 ³	95.1	90
2	150	82	86	Not Firing	Not Firing	33% ²	Not Firing	Not Firing	85.8
3									
System efficiency at part load							96.9	95.1	89.1 ⁴
Weighting factor							0.36	0.45	0.19
Overall seasonal boiler efficiency							94.6 ⁵		

Notes:

1. Calculated based on the following: $15\% \times \text{Heating Load (200kW)} = 20\%$

Boiler 1 Load (150kW)

2. Calculated based on the following: $\frac{\text{Heating Load (200kW)} - \text{Boiler 1 Load (150kW)}}{\text{Boiler 2 Load (150kW)}} = 33\%$

3. Calculated by the linear interpolation $\eta_{b,p} = \eta_{30\%} - (\eta_{30\%} - \eta_{100\%}) * (q_{b,p} - 30\%) / (100\% - 30\%)$

$$\eta_{20\%} = 96 - (96 - 90) * (20\% - 30\%) / (100\% - 30\%)$$

$$\eta_{20\%} = 96.9$$

4. Calculated by dividing the thermal output of the system by the rate of fuel combustion, which is given by the sum of the boiler outputs divided by their individual operating efficiency.

$$\eta_{100\%} = 200 / ((150 * 100\% / 90) + (150 * 33\% / 85.8))$$

$$= 89.1\%$$

5. Calculated as the weighted average;

$$= 0.36 * 96.9 + 0.45 * 95.1 + 0.19 * 89.1$$

$$= 94.6\%$$

Example 2: Building with 2 Air Cooled Chillers.

Information from Building Survey can be processed in a similar fashion for chillers in a similar fashion to Example 1 above:

Cooling Load: 500kW

	Chiller 1	Chiller 2
kW Rating	250kW	250kW
Stage	Lead	Backup
Chiller Efficiency	2.5 at 100% load 3.5 at 50% load	2.5 at 100% load 3.5 at 50% load

The combined EER value should be calculated as follows:

Chiller	Chiller kW	Chiller efficiency at chiller outputs of		Chiller % output at system outputs of				Chiller % efficiency at system outputs of			
		100%	50%	25%	50%	75%	100%	25%	50%	75%	100%
1	250	2.5	3.5	50%	100%	100%	100%	3.5	2.5	2.5	2.5
2	250	2.5	3.5	Not Firing	Not Firing	50%	100%	Not Firing	Not Firing	3.5	2.5
3											
System efficiency at part load								3.5	2.5	2.76 ^a	2.5
Weighting factor (based on unknown application load profile as per Compliance Guide Section 9.5)								0.25	0.25	0.25	0.25
Overall chiller SEER								2.82 ^b			

Notes:

a) Calculated by dividing the thermal output of the system by the rate of fuel combustion, which is given by the sum of the chiller outputs divided by their individual operating efficiency.

$$\begin{aligned}
 \text{eer}_{75\%} &= 375 / ((250 * 100\% / 2.5) + (250 * 50\% / 3.5)) \\
 &= 2.76
 \end{aligned}$$

b) Calculated as the weighted average;

$$\begin{aligned}
 &= 0.25 * 3.5 + 0.25 * 2.5 + 0.25 * 2.76 + 0.25 * 2.5 \\
 &= 2.815
 \end{aligned}$$

Example 3: Existing Building with Gas Boiler and Controls.

Information from Building Survey:

Heating Load: 200kW

	Boiler 1
kW Rating	300kW
Fuel Type	Gas
Stage	Lead
Boiler Efficiency based on Gross Calorific Value	82%
Temperature Controls	TRVs on all radiators
	Optimised Start/Stop

Using Table 8 of the Compliance Guide the seasonal efficiency is calculated as follows:

	Heating Efficiency Credits
Boiler Efficiency	82%
System uses TRVs to ensure full building temperature control	1
System uses Optimised Start/Stop to achieve specified conditions during occupancy period	2
Total Credits	3

Effective boiler seasonal efficiency:

$$\begin{aligned}
 &= \text{Boiler Efficiency} + \text{maximum of 4 heating efficiency credits} \\
 &= 82\% + 3\% \\
 &= \mathbf{85\%}
 \end{aligned}$$