Non-Domestic Energy Assessment Procedure
Survey Guide

VERSION: 1.2

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 must 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 site 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 in accordance with the BER Quality Assurance System and Disciplinary Procedure.

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Contents

Key Changes and Additions

This section summarises the key differences between the current NEAP Survey Guide (V1.2) and V1.1.

SECTION	SUMMARY OF CHANGE
Section 1: Introduction	Verification of requirements for publication of BERs and use of alternate software.
Section 4: Data Gathering	Clarification on use of "As Built" and "Construction" drawings
Section 4: Data Gathering	Clarification on use of photos as documentary evidence to support entries in SBEM
Section 4.8: Data Gathering	Guidance on missing or non operational building services equipment
Section 6: Guidance on Supporting Evidence	Definition of a suitably qualified engineer/architect
Section 6: Guidance on Supporting Evidence Section 7: Heat losses for different building elements	Clarification on calculation of Non Default thermal properties for building elements
Section 6.1: Non Default Efficiency Data Section 7: Heating system efficiencies	Clarification on acceptable sources of Non Default Efficiency Data
Section 7: Window U-value, T-Solar and L-Solar	Clarification on treatment of films/ signage applied to glass for promotion
Section 7: Thermal Bridges	Update on acceptable PSI value calculation to meet NEAP/ TGD L
Section 7: Electricity Power Factor	Clarification on demonstrating selection of non default Power Factor data
Section 7: ECA/ACA data	Clarification on use of data from ECA/ACA webpages
Section 7: HWS / Generator Type	Guidance on addressing multiple HWS systems in building
Section 7: HWS / Generator Type	Guidance on addressing HWS allocation in multiple tenants/ premises buildings
Section 7: Lighting Parameters not available	Guidance on multiple lighting systems in a zone where splitting the zone is not practicable
Section 7: Deadleg length in this zone	Guidance on measurement of Deadlegs in zone
Section 7: Local Manual Switching	Guidance on local manual switching
Section 7: Photoelectric Options	Guidance on identifying photoelectric sensors
Appendix 2	Further guidance of zoning in corner offices
Appendix 4.1: Age of Building	Clarification of use of default constructions and uninsulated elements
Appendix 4.2: Constructional Types	Guidance on the selection of default elements based on building age and element type
Appendix 4.2: Constructional Types	Clarification on the selection of window and frame types
Appendix 4.3: HVAC System Defaults	Clarification on the selection of default HVAC systems
Appendix 4.4: HWS System	Clarification on selection of DHW storage age
Appendix 4.8: Shell and Core Buildings	Clarification on Shell and Core HVAC systems
Appendix 4.9: Unheated Buildings	Guidance on entering unheated buildings into iSBEM
Appendix 4.10: LED Lighting	Guidance on entering LED lighting into iSBEM where full lighting design is not available
Appendix 4.11: Display Lighting	Guidance on addressing selection of energy efficient lamps for display lighting when no display lighting is present in zone.
Appendix 4.12: Non Default Km value	Clarification on calculating non default Km values and values for Specific Heat Capacity for typical elements
Appendix 6: Determining Zone Heights and U-values	Guidance on calculation of zone heights and U-values
Appendix 7: Identifying Heating System	Guidance on identifying heating systems within buildings and zones
Appendix 8: Adjoining Conditioned and Unconditioned Zones	Guidance on adjoining conditioned and unconditioned spaces
Appendix 9: Determining DHW Storage Volume	Guidance on the calculation of HWS Storage volumes
Appendix 10: Selection of Solid Fuel Type	Clarification over the selection of the appropriate solid fuel.
Appendix 11: Identifying Common Lighting systems	Assistance in identifying Lighting Systems

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 software[1].
This manual does not replace the iSBEM User Guide, NEAP Modelling Guide or SBEM Technical Manual. It provides additional guidance relating specifically to surveying of non domestic buildings and should be read in conjunction with the iSBEM User Guide, NEAP Modelling Guide and SBEM Technical Manual 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.

The current published version of the NEAP Survey Guide is available on 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 iSBEM User Guide 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 and the building owner's own 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.

[1] Throughout this Guide, the term "Approved Software" is used to denote iSBEM and other SEAI approved BER software as published on the SEAI website.
Assessors who have been accredited to use alternate software should note the following:

- Non default values should be used where possible, however where these cannot be substantiated default values must be used. The default values to be used are as outlined in the iSBEM User Guide, iSBEM software and the NEAP survey guide. It is the responsibility of the assessor to ensure that any defaults used in alternate software comply with the iSBEM software and aforementioned documents. Third party software does not necessarily use or provide the same defaults as iSBEM.
- In all cases, the methodology outlined in the iSBEM user guide, and NEAP Survey Guide takes precedence over guidance from third party software.

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.
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.

The survey guide should be read in conjunction with the following documents

- iSBEM User Guide
- NEAP Modelling Guide and SBEM Technical Manual
- BER Assessors Code of Practice
- BER Quality Assurance System and Disciplinary Procedure
- Non Domestic Building Services Compliance Guide (UK)
- Non Domestic BER Technical Bulletins

Information required on Building Regulations Part L (current or previous) is provided on http://www.environ.ie/en/TGD.

A Building Energy Rating is required under the following circumstances:

- When a new or existing building is offered for sale (or let) a BER certificate must be produced by the vendor or their agent (e.g. auctioneer, estate agent or solicitor) to potential buyers or tenants.
- When a new building is offered for sale "off plans" a provisional BER certificate must be produced by the vendor to potential buyers or tenants, based on the pre-construction plans; and when the same new building is completed, a BER certificate must be supplied to the purchaser, based on a survey of the buildings as constructed (to take account of any design changes during construction).
- When a new building is built for a specific owner-occupier: A BER certificate must be procured by the person commissioning the building, prior to taking up occupation of the building.
- A person offering a property for sale or rent on or after 9th January 2013, or their agent, shall ensure that the energy performance indicator of the current BER certificate for the building is stated in any advertisements, where such advertisements are taken relating to the sale or letting of that building.
- Prospective buyers and renters will be shown the BER rating (Alphanumeric value) along with other prescribed content (dependent on the particular medium) in a prominent location in each specific advertisement
- Where images of the property are used then the presentation of the alphanumeric value will be by way of the prescribed BER Alphanumeric Rating Motif for the particular property rating

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 to 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 must be retained by the Assessor and provided to the SEAI BER 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;
- 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 is required to substantiate any entries in the NEAP software. This documentary evidence must be retained by the Assessor as outlined in the BER Assessor's Code of Practice. BER Assessors must 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. In verifying "As Built" drawings, assessors should have documentary evidence from the site survey to support the drawings, for example; marked up drawings showing measurements on site, photographs and completed survey forms from site survey.

"Issued for Construction" drawings can also be used as documentary evidence to support a BER, however the "Issued for Construction" drawings must be supplemented with documentary evidence from a site survey.
For example an Assessor has "Issued for Construction" drawings from the M&E consultant detailing the lighting installation. The Assessor should provide additional information to substantiate that the lighting was installed as per the "Issued for Construction" drawings. This should be:

- Photographs of the light fitting as installed.
- Survey Sheet detailing the light fittings as installed.

If clarification is required by the BER Assessor, specific queries related to the acceptability of supporting documentary evidence 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 documentary evidence 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.

In addition to the above, the assessor is required to provide photographic evidence to support data gathered during the survey of the building as detailed in Section 7 of the Survey Guide. Assessors should reference the photograph applicable to each zone on the survey form, for example:

ZONES: BUILDING SERVICES DETAILS					
Zone name	**Description**	**Building type**	**Activity#**	**Area m2**	**Height m**
z0/01	Open Plan Office Photos 001 - 005	Office	Open Plan Office	100	3.5
z0/02	WC Photos 006	Office	Toilet	10	3.5

The reference used on the survey form should correlate to the name of the photograph filename supplied as documentary evidence during the audit process.

Photographs must be clear. Assessors should read the camera's manual to gain a full understanding of how the camera is operated, paying particular attention to the use of flash, macro and focus.
The following simple tips should also be adhered to:

- Ensure that the camera is set up correctly prior to taking the photograph. It is important to ensure that adequate resolution is set up.
- Hold the camera steady;
- Give the camera time to focus;
- For close-up shots, the camera's macro function may take several seconds to gain correct focus;
- Use the flash in poorly lit spaces (the camera's auto-flash setting will do this automatically, generally with good results);
- When using the flash on a object several metres away try to ensure there are no objects in the foreground as this can affect the focus and/or over-expose the photograph;
- Check the photograph. If it is not of sufficient quality, retake the photograph.

4.1 External Survey

An initial survey of the outside of the building should be carried out. The following information can be gathered by external survey:

- 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 indicators, 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 assists 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, zone, 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.
- Identifying internal elements with high thermal mass composition.
- Identifying elements adjoining unconditioned spaces.

4.3 Building Sketches and Architectural Drawings

A sketch of the building must be made showing 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 must 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/drawings, 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;
- Activity in each zone
- 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 must 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 must be altered to reflect changes in the finished building.

Each room/area must 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).

Refer to Appendix 2 for Guidance on Zoning, Appendix 3 for a List of Activities and Appendix 6 for examples of zone height calculation.

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 must be recorded where accessible and a photo must be taken to facilitate later identification of the equipment concerned in support of data entered in the data file.

4.6 Ceiling and Floor Voids

Accessible ceiling and floor voids must be inspected to determine what equipment, particularly HVAC equipment, is present. This provides 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.

4.8 Missing or Non Operational Building Services Equipment

NEAP assumes that the fixed installed building services equipment is operational and takes no account of whether it is working or not. However where a system is missing and therefore not installed, the system should be based on the default for the system.

For example in the case of a building served by a central heating system with radiators and the boiler is missing or removed, the assessment should be based on a default HVAC system (refer to section A4.3) as there is no heat source in the building. Similarly, if there are no space heat emitters, the boiler cannot heat the building and therefore a default HVAC system should be assumed.
In the case of a missing or removed cylinder, where the cylinder is required to provide hot water, effectively there is no facility to heat hot water and therefore a default HWS system is used (refer to section A4.4).
In the case of controls that are not operational but are installed, for example lighting controls, it is assumed that they are operational and should be accounted for.

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 auditing, monitoring and compliance processes commenced by SEAI.

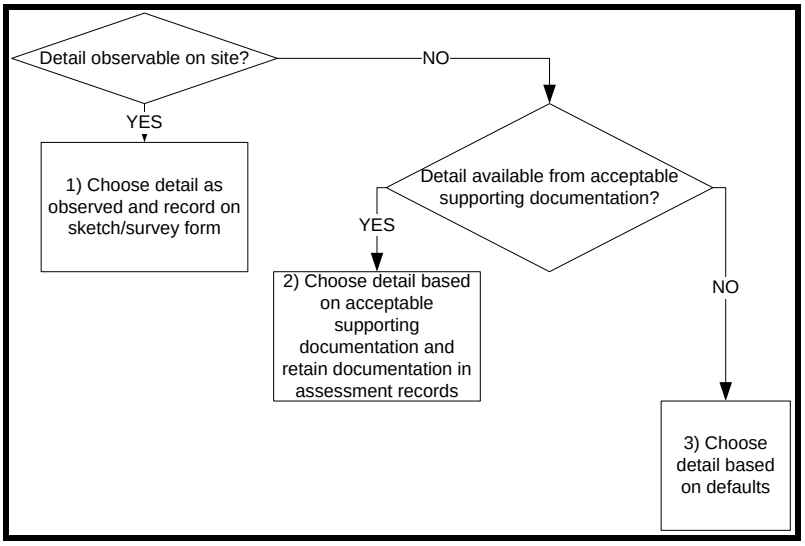
Refer to the SEAI BER Quality Assurance and Disciplinary Procedure and the BER assessors Code of Practice for further guidance.

6 Guidance on Supporting Evidence

As a general rule the default values in NEAP are conservative and must 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 defaults 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.

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



This order of priority must 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 is 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.

Non default values can be supported by a range of documentation as outlined in Section 7. Examples of documentary evidence include "As Built drawings, Reports of works, Photographs, Copies of invoices/ receipts etc.

The copy of invoices/ receipts must have a detailed description of the work concerned and must clearly identify the work with the building concerned.

Reports of works carried out in the building from a suitably qualified supervising engineer or architect are acceptable as supporting documentary evidence. A suitably qualified person is defined as a FETAC level 7 qualification or higher in one of the following building construction related disciplines:

- Architecture
- Architectural Technology
- Building Services Engineering
- Civil Engineering
- Electrical Engineering
- Mechanical Engineering

- Quantity Surveying

Such reports need to provide sufficient detail for the NEAP entry in question.

For example, for retrofitted insulation, the invoice/receipt or 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 – Buildings Other Than Dwellings (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 (for example an Agrement Certificate from the NSAI) in compliance with the relevant standards in TGD L. For new-final BERs, thermal conductivity values for insulation products must be obtained from accredited test data to the relevant standards in TGD L.

General Guidance on the Calculation of U-values to the relevant standards is contained in Report BR 443 "Conventions for U-value Calculations" 2006. For building elements and components generally, the method of calculating U-values is specified in I.S. EN ISO 6946: 1997. U-values of components involving heat transfer to the ground, e.g. ground floors with or without floor voids, basement walls, are calculated by the method specified in I.S. EN ISO 13370: 1999. Software packages to perform U-value calculations for different building elements in accordance with the relevant standards above are readily available. Details, such as element thicknesses, thermal conductivities and resistances, used in carrying out U-value calculations must be retained in the BER assessment records by the BER Assessor.

Where there is adequate documentary evidence to support a non-default U-value, a non-default $\mathbf{k_m}$ value must also be used based on the makeup of the construction. The $\mathbf{k_m}$ value is calculated in compliance with CEN standard: EN 13790 using the method in 7.4.1 of the iSBEM User Guide. The $\mathbf{k_m}$ value is the effective thermal capacity of an element and accounts for the time it takes for heat to flow in or out of the building fabric. Refer to Section A4.12 for details on calculation of $\mathbf{k_m}$ values.

6.1 Non Default Efficiency Data

The following outlines acceptable sources of non default efficiency data for use in conjunction with the Non-Domestic Building Services Compliance Guide: 2010:

- Performance data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard.
- Literature from manufacturer referencing the efficiency and relevant test performance standard.
- Accredited Test certificates clearly relating to the product in question or as verified by the manufacturer/ supplier as having the same performance as the installed product, must comply with the following:
    - Installation instructions in the test certificate on which the stated performance depends must be adhered to;
    - Test certificates must be in English or be accompanied by a certified English translation. The translation can be from the accredited test house or from a professional translator listed by the Irish Translators and Interpreters Association or international equivalent;
    - The relevant test performance standard must be stated on the test certificate;
    - The test laboratory must be accredited. This may be demonstrated as follows:
        - The governing accreditation body for the test laboratory can be found under http://www.european-accreditation.org/ . This governing body may list the test laboratory as accredited;
        - The accredited laboratory may be found under http://ec.europa.eu/enterprise/newapproach/nando/ .

7 Information Regarding Individual iSBEM Inputs

The following tables supplement the software application manual (i.e. iSBEM User Guide) when gathering 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 must 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 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 is generally obvious; office block, school, factory, warehouse, etc. This relates to the current building use which may have changed since the building was built, e.g. school house converted to restaurant. The Building Type sets the activities that may be assigned to the zones. Refer to Appendix F of the iSBEM User Guide for a list of activities associated with the building types. However, alternative activities for other building types remain available at zone level. The Building Type defines the majority of the building and is displayed on the BER certificate.	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. Similar methods must be applied when determining the age of any extensions/major refurbishments within the building.	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, supported by documentary evidence may be used (a minimum of two indicators are

	Refer to Appendix 4 for the relationship between the age of construction and relevant building regulations. The "Year of Construction" is that of the original completion date of the building. Further information on the date of renovations and extensions can be provided in the "Location Description".	required) : • 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 (in writing).
MPRN number	The MPRN can be found on the electricity bill 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.	Copy of utility bill for the building or as supplied by the utility provider. Photograph of the electricity meter box.
Building Address	Address to identify the location of the building, should be taken from utility bills.	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. Utility bills, An Post's address verification service, Geodirectory and Bizmaps provide other means of verifying the building address.

iSBEM Software Tab: "Project Database"		
Data Entry Item	**Guidance**	**Documentary Evidence**
Heat loss roof U-values and Thermal Capacity Value **k_m**	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. Non-default values should be used where possible. The Assessor is 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. U-values and **k_m** values should be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide and Appendix A of TGD L. Section 6 of this Survey Guide outlines the relevant guidance and standards for U-value calculations. Where there is adequate documentary evidence to support a non-default U-value, a non-default **k_m** value must also be used based on the makeup of the construction. Section 6 of this Survey Guide outlines the relevant guidance. 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. 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.	The evidence required to use non-default building characteristics (eg, U-values/ **k_m** values) are met by one of the following: • "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. Documents should indicate address, date and insulation material and thickness used. Photographs/photocopies of documentation should be retained as supporting evidence.

Wall U-values and Thermal Capacity Value $\mathbf{k_m}$	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. Non-default values should be used where possible. The Assessor is 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. U-values and $\mathbf{k_m}$ values should be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide and Appendix A of TGD L. Section 6 of this Survey Guide outlines the relevant guidance and standards for U-value calculations. Where there is adequate documentary evidence to support a non-default U-value, a non-default $\mathbf{k_m}$ value must also be used based on the makeup of the construction. 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. The presence of additional insulation must be supported by appropriate documentary evidence.	The evidence required to use non-default building characteristics (eg, U-values/ $\mathbf{k_m}$ values) are met by one of the following: • "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. Documents should indicate address, date and insulation material and thickness used. Photographs / photocopies of documentation should be retained as supporting evidence.

Floor U-values and Thermal Capacity Value $\mathbf{k_m}$	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. Non-default values should be used where possible. The Assessor is 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. U-values and $\mathbf{k_m}$ values must be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide and Appendix A of TGD L. Section 6 of this Survey Guide outlines the relevant guidance and standards for U-value calculations. Where there is adequate documentary evidence to support a non-default U-value, a non-default $\mathbf{k_m}$ value must also be used based on the makeup of the construction. 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.	The evidence required to use non-default building characteristics (eg U-values/ $\mathbf{k_m}$ values) is met by one of the following: • "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. Documents should indicate address, date and insulation material and thickness used. Photographs / photocopies of documentation should be retained as supporting evidence.

Door U-Value and Thermal Capacity Value $\mathbf{k_m}$	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. Non-default values should be used where possible. The Assessor is expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values. U-values and $\mathbf{k_m}$ values must be calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide and Appendix A of TGD L. Section 6 of this Survey Guide outlines the relevant guidance and standards for U-value calculations. Where there is adequate documentary evidence to support a non-default U-value, a non-default $\mathbf{k_m}$ value must also be used based on the makeup of the construction. 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.	The evidence required to use non-default building characteristics (eg, U-values/ $\mathbf{k_m}$ values) are met by one of the following: • "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. Documents should indicate building address, date and details of the door in question. Photographs / photocopies of documentation should be retained as supporting evidence.

Window U-value, T-Solar and L-Solar	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, a 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. Non-default values should be used where possible. The Assessor is expected to show that reasonable efforts were made to ascertain actual values rather than opting for default values. Non-default values for U-values, Solar and Light Transmittance values supplied by manufacturers or suppliers are calculated based on the standards outlined in Section 7.4 of the iSBEM User Guide and Appendix A of TGD L. Reference must be made to the relevant standards in any documentation provided by the manufacturer/ supplier. Film or signage applied to the glass to advertise/ promote services or products is regarded as occupier behaviour and should be ignored for the purposes of the BER assessment.	The evidence required to use non-default building characteristics (eg, U-values) are met by one of the following: • "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.

<u>iSBEM Software Tab: "Geometry > Project"</u>		
Data Entry Item	**Guidance**	**Documentary Evidence**
Building Infiltration	Use the air permeability default value of 25 $m^3/h/m^2$ at 50 Pa unless a valid acceptable pressure test certificate is available.	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. 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".

		Individuals/ organisations carrying out pressure tests must also demonstrate that they are competent to carry out the testing. Individuals may, for example, demonstrate competence to carry out permeability tests on buildings by being registered under the NSAI's Air Tightness Testers Scheme. 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) or any other bodies capable of providing accreditation to ISO /IEC 17025: "General Requirements for the Competence of Testing and Calibration Laboratories"
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	For existing buildings, it is unlikely that sufficient evidence will be obtainable to substantiate the use of non-default thermal bridging values. Non-default thermal bridging values should be used where possible for new buildings. The Assessor is 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. 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. 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, 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. TGD L Section D2 requires that Ψ values are calculated in accordance with I.S. EN 10211. Certification of the detail by a member of the NSAI Thermal Modellers' Certification Scheme is a means of meeting the requirements in TGD L and NEAP for calculation of Ψ values.

iSBEM Software Tab: "Geometry > Zones > General"		
Data Entry Item	**Guidance**	**Documentary Evidence**
HVAC System	The use of default HVAC systems is detailed in Appendix 4 and Appendix 7. The appendices deal specifically with the following circumstances: - Shell and Core Buildings - No HVAC present in the building/ zone For further detail on default HVAC systems refer to 7.5.3 of the iSBEM User Guide.	The evidence required in order to use non-default building characteristics is met by one of the following in conjunction with the plantroom survey and ceiling void details: • Copy of as built HVAC drawings and specifications; • Copy of technical details from operational and maintenance manuals;

	The BER is based on non default HVAC systems where there is sufficient evidence available. As outlined in Section 6 the Assessor is expected to show that reasonable efforts were made to ascertain non-default values rather than opting for default values.	• Representative photographs of the HVAC system.
Building Type/ Activity	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. For details Refer to 7.5.3 of the iSBEM User Guide.	In combination with the floor by floor sketches /architectural drawings marked up to show zones the following should be provided: • Survey Form; • Note on basis used to define zones.
Area	Floor area of zone. Refer to Section 3.4 Measurement and Other Conventions and Section 7.5.3 of the iSBEM User Guide.	Floor by floor sketches with dimensions and calculations or Architectural drawings with dimensions and calculations marked up to show zones.
Height	Height of zone Refer to Section 3.4 Measurement and Other Conventions and Section 7.5.3 of the iSBEM User Guide. Refer to Appendix 6 of the NEAP Survey Guide for examples of zone height calculation.	Building sketches with dimensions, calculations and Survey Form or Architectural drawings with dimensions, calculations and Survey Form. Building sketches/ architectural drawings should show the depth of all components, including floor slabs, floor voids, ceiling voids etc.
Zone Infiltration	Use the air permeability default value of 25 $m^3/h/m^2$ at 50 Pa unless a valid pressure test certificate is available.	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. 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". Refer to Building Infiltration for guidance on individuals/

		organisations carrying out tests.

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. Refer to Appendix 8 for further guidance.	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/ doors. Refer to Section 3.4 of iSBEM User Guide for measurement conventions.	Floor by floor sketches with 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 is expected to show that reasonable	Where a non-default value is used, acceptable documentary evidence must be provided for the building. Refer to thermal bridging in section **iSBEM Software Tab: "Geometry > Project"** for guidance on documentary evidence required.

	efforts were made to ascertain actual values rather than opting for default values.	

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, and Vehicle Access Doors.	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.

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.
Display Window Tickbox	This is an area of glazing intended for the display of products or services on offer within the building, positioned: • At external perimeter of the building; and • At an access level and immediately adjacent to a pedestrian thoroughfare. There should be no permanent workspace within one glazing height of the perimeter. Glazing more than 3m above such an access level should not be considered part of the display window except: • Where the products on display require a greater height of glazing; • In cases of building work involving changes to the façade and glazing requiring planning consent, where planners should have discretion to require a greater height of glazing; eg to fit in with surrounding buildings or to match the character of the existing façade.	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.
<u>iSBEM Software Tab: "Building Services > Global and Defaults > Project Building Services"</u>		
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" is met by one of the following • 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 must 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. Review the 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 must be used in an existing building unless analysis of the recent 12 month's bill data indicates a different value. The default power factor value of <0.9 must be used in a new building unless: ***1)*** A power factor of >0.95 can be used in a new building where there is adequate documentary evidence to support the installation of power factor correction equipment within the building for final certificates and the proposed installation of power factor correction equipment for provisional certificates. ***2)*** A non-default power factor can be used for a Final BER in a new building where a suitably qualified electrical engineer has produced a report detailing the power factor for the building as constructed. ***3)*** A non-default power factor can be used for a Provisional BER in a new building where a suitably qualified electrical engineer has produced a report detailing the power	Electricity utility bills for 12 month period prior to assessment of an existing building. For a new building, detail of installed power factor correction equipment or a signed report from a suitably qualified electrical engineer.

	factor for the building as per the design.	
District Heating Parameters	The default value must be used if District Heating is selected as the heat source and there is no documentary evidence to substantiate non-default entries. A non-default value is used where possible. The Assessor should ascertain the CO_2 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.	For existing buildings, a report from the district heating scheme operator, detailing how the CO_2 emission and primary energy factors for the district heating have been derived. The calculations should be based on actual fuel bills over a 1 year period. The CO_2 emission factors and primary energy factors for the fuel(s) used by the district heating system should be taken from Table 2 of the iSBEM User Guide. For new buildings, a report from a suitably qualified member of the design team, detailing how the CO_2 emission and primary energy factors for the district heating have been derived. The calculations should be based on predicted fuel consumption over a 1 year period. The CO_2 emission factors and primary energy factors for the fuel(s) used by the district heating system should be taken from Table 2 of the iSBEM User Guide.

iSBEM Software Tab: "Building Services > HVAC Systems > General"		
Data Entry Item	**Guidance**	**Documentary Evidence**
Type	Select from the Building Services Type options in Database for Building Services. Follow guidance in Section 7.6.2 of the iSBEM User Guide. 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. The Assessor must be familiar with the various types of HVAC system as categorised in Table 13 of the *i*SBEM User Guide. The Assessor must be capable of categorising the system based on the limited information	In conjunction with the plantroom survey details and ceiling void details the evidence required is met by one of the following: • 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;

	available on site.	• As Built drawings and specifications. The basis for categorising a system must be documented and retained together with supporting information.
Heat Source	Select from the Heating Sources options in the database	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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 For further guidance on the selection of solid fuel types refer to Appendix 10.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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.
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".	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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	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 must 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 efficiency values must be in compliance with Section 10.5 of "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK. Non-default efficiencies may be obtained from the following sources as per Section 6.1: • Performance data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard. • Literature from manufacturer referencing the efficiency and relevant test performance standard. • Accredited Test certificates to the relevant test performance standard	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of heat recovery unit; • Copies of technical data sheets from operational and maintenance manuals • Sources of efficiency as outlined in "Guidance" and Section 6.1; • 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 specific equipment make and model number and show corresponding details on ACA webpage (or ECA, the UK equivalent). Include a snapshot of the relevant page from the website. A web link to the page is not acceptable. ECA allows the user to receive an automated email with the product listing. ACA can generate an Excel file with the product listing. Both of these are acceptable as supporting evidence for this entry.
Do you know the effective heat generating seasonal efficiency?	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. Non-default efficiency values must be calculated in compliance with "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK. Refer to Appendix 5 of this Survey Guide for examples of how the Compliance Guide is used. 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. 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. Non-default efficiencies may be obtained from the following sources as per Section 6.1: • Performance data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard. • Literature from manufacturer referencing	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of heat source plant (eg boiler nameplates and manufacturer name) and manufacturer's data sheets; • Sources of efficiency as outlined in "Guidance" and Section 6.1; • 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.

iSBEM Software Tab: "Building Services > HVAC Systems > Heating"		
Data Entry Item	**Guidance**	**Documentary Evidence**
	the efficiency and relevant test performance standard. • Accredited Test certificates to the relevant test performance standard • ECA/ ACA websites, where technology has been tested to the relevant test performance standard. The Assessor should use default values only if it is 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.	
Do you know the generator radiant efficiency?	For radiant heaters the Heat Generator Seasonal Efficiency is equivalent to its thermal 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.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of heat source plant(eg boiler nameplates and manufacturer name) and manufacturer's data sheets; • Sources of efficiency as outlined in Section 6.1; • 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 is met by one of the following: • 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	Refer to previous section **"Building Services >**	Refer to previous section **"Building**

iSBEM Software Tab: "Building Services > HVAC Systems > Heating"		
Data Entry Item	**Guidance**	**Documentary Evidence**
uses CHP	**HVAC Systems > General"**	**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 is met by one of the following: • 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	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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?	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/ECA webpage as outlined above.
Do you know the generator seasonal energy efficiency ratio (SEER)?	Non-default efficiency values must be calculated in compliance with "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK. Refer to Appendix 5 of this Survey Guide for examples of how the Compliance Guide is used.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of cooling plant (eg chiller nameplates and manufacturer name) and manufacturer's data sheet;

	Non-default efficiencies may be obtained from the following sources: • Performance data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard. • Literature from manufacturer referencing the efficiency and relevant test performance standard. • Accredited Test certificates to the relevant test performance standard. • ECA/ ACA websites, where technology has been tested to the relevant test performance standard. • Eurovent website, where technology has been tested to the relevant test performance standard. The Assessor should use default values only if it is 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.	• Sources of efficiency as outlined in "Guidance" and Section 6.1; • 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)?	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. 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. Non-default efficiencies may be obtained from the following sources: • Performance data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard. • Literature from manufacturer referencing the efficiency and relevant test performance standard. • Accredited Test certificates to the relevant test performance standard.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of cooling plant (eg chiller nameplates and manufacturer name) and manufacturer's data sheet; • Sources of efficiency as outlined in "Guidance" and Section 6.1; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.

	• ECA/ ACA websites, where technology has been tested to the relevant test performance standard. • Eurovent website, where technology has been tested to the relevant test performance standard. The Assessor should use default values only if it is 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.	
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)?	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. 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. Non-default efficiencies may be obtained from the following sources: • Performance data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard. • Literature from manufacturer referencing the efficiency and relevant test performance standard. • Accredited Test certificates to the relevant test performance standard.	The evidence required is met by one of the following: • Photographs of fan nameplates and manufacturer's data sheets; • Sources of efficiency as outlined in "Guidance" and Section 6.1; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications. Calculations of SFP must be retained as evidence.

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.	The evidence required is met by one of the following: • 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.	The evidence required in order to answer "Yes" is met by one of the following • 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. Review the 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 the case of multiple tenants/premises in a building: • Where the hot water services are supplied to each tenant by a central water heating	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of HWS plant (eg boiler nameplates and

	system, (e.g. from the landlord to the tenant's premises) the efficiency and storage volume should be based on the details of that central system. Where this information is not available default data must be used. • Where the hot water services are part of the tenant's system, the efficiency and storage volume should be based on the details of the tenant's services. Where this information is not available default data must be used. In the case where more than one HWS serves a building, the HWS system that is assigned to a zone is the HWS system that accounts for the majority of the HWS demand in that zone. To identify the system that serves the majority of the HWS demand, determine what each system serves and the associated hot water demand for each system. Apply NEAP Survey Guide Section A4.4 when there is no hot water system present in the building.	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 is met by one of the following: • 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 For further guidance on the selection of solid fuel types refer to Appendix 10.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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.
Do you know the effective heat generating seasonal efficiency?	Non-default efficiency values must be calculated in compliance with "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK including calculation of heating efficiency credits. Default values should only be used if it is not possible to obtain the HWS plant efficiency data required with evidence to substantiate this, such as correspondence from manufacturer stating that efficiency is not available. Non-default efficiencies may be obtained from the following sources: • Performance data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard. • Literature from manufacturer referencing the efficiency and relevant test performance standard. • Accredited Test certificates to the relevant standard. • ECA/ ACA websites, where technology has been tested to the relevant test performance standard.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of HWS plant(eg boiler nameplates and manufacturer name) and manufacturer's data sheet; • Sources of efficiency as outlined in "Guidance" and Section 6.1; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Is the system a storage system	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.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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	The storage volume, insulation type and thickness are entered if the storage losses in MJ/month are unknown. If no value is entered, iSBEM uses default values. Where storage volume is not available from	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of HWS Cylinder and nameplates and manufacturer

	other sources, and storage is accessible, estimate storage volume by measuring the dimensions of the storage vessel. Refer to Appendix 9 of this Survey Guide for guidance on determining the storage volume of the storage unit. The Assessor should use default values only if it is not possible to obtain the HWS plant data or measure volume on site, and should have evidence to substantiate this. Where storage insulation details are not available from other sources, and insulation is accessible, estimate insulation depth by measuring its thickness (e.g. using a pin). Default hot water cylinder insulation thicknesses in Appendix A4.4 are used if insulation is inaccessible.	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)
Does the System have Secondary Circulation	The Assessor must ascertain if the HWS system has secondary circulation.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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	If no value is entered, iSBEM uses default values The Assessor should use default values only if it is not possible to obtain the HWS plant details and should have evidence to substantiate this.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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.	In conjunction with the external survey details, the evidence required is met by one of the following: • Copies of technical data sheets from operational and Maintenance Manuals; • As Built drawings and specifications.
Area	Enter the aperture area of the solar collectors	The evidence required is met by one of the following: • Copies of technical data sheets measured in accordance with EN 12975 or data from the HARP database; • Sources of efficiency as outlined in Section 6.1; • 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	The evidence required is met by one of the following: • 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^{O} to 90^{O}. 0^{O} tilt represents a horizontal surface 90^{O} tilt represents a vertical surface	The evidence required is met by one of the following: • 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.	The evidence required is met by one of the following: • 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; • Sources of efficiency as outlined in Section 6.1; • Copies of technical data sheets from Operational and Maintenance Manual measured to EN 12975-2 by a body with relevant accreditation; • As Built drawings and specifications.
Solar Storage	The dedicated solar storage volume associated with the solar panel, insulation type and thickness are entered. Appendix 9 of this Survey Guide provides guidance on determining the storage volume of storage units, while Section 7.6.4 of iSBEM User Guide gives criteria for determining the dedicated solar storage volume for various arrangements.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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?	Enter "There is no heat exchanger" if the system is a direct system. 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. Enter "Yes, value is..." if the value is known. Refer to Section 7.6.4 of iSBEM User Guide for guidance.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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?	Enter "No, use the default" if it is not possible to obtain the performance data for the pipework in the collector loop. Enter "Yes, value is" if the value is known. Refer to Section 7.6.4 of iSBEM User Guide for guidance.	In conjunction with the plantroom survey details, the evidence required is met by one of the following along with provision of representative photographs of the pipework: • 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?	This only becomes active if there is a separate solar cylinder to the HWS cylinder.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • Photographs of pipework; • As Built drawings and specifications.
Auxiliary Energy Consumption	Select from the circulation systems listed in the database.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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	The evidence required is met by one of the following: • 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 is met by one of the following: • 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^O to 90^O. 0^O tilt represents a horizontal surface 90^O tilt represents a vertical surface	The evidence required is met by one of the following: • 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.	In conjunction with the external survey details, the evidence required is met by one of the following: • Photographs of surrounding sites; • Site plan showing surrounding sites.

Horizontal Axis - Diameter	Enter the Diameter of the Wind Turbine	The evidence required is met by one of the following: • 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	The evidence required is met by one of the following: • 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 is met by one of the following: • 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 is met by one of the following: • 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 is met by one of the following: • 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 is met by one of the following: • 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; • Sources of efficiency as outlined in Section 6.1; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Electrical Efficiency	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 is met by one of the following: • 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; • Sources of efficiency as outlined in Section 6.1; • Copies of technical data sheets from operational and maintenance manuals; • As Built drawings and specifications.
Building Space Heat Supplied	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	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	Ascertain if the building has a Trigeneration system.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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	For existing buildings, a report from the Building Operator detailing the proportion of cooling supplied to the building by the Trigeneration. 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. For new buildings, a report signed by

		engineers from the Design Team, detailing the predicted proportion of space cooling supplied by the CHP.
Chiller Efficiency	The seasonal chiller efficiency of the generator, defined as the cooling demand divided by the cooling energy for the generator.	In conjunction with the plantroom survey details, the evidence required is met by one of the following: • 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; • Sources of efficiency as outlined in Section 6.1; • As Built drawings and specifications.

iSBEM Software Tab: "Building Services > Zones > HVAC, HWS & Lighting Systems"		
Data Entry Item	**Guidance**	**Documentary Evidence**
Deadleg Length in this zone	Length of draw off pipe to the outlet in the space (only used in zones where the water is drawn off). The deadleg distance is measured from the edge of the zone or from the storage vessel/ circulation in the zone to the outlet point. Where pipework is not visible in the zone and drawings are unavailable, allow for the deadleg running from the edge of the zone or from the storage vessel/ circulation in the zone to the outlet point.	The evidence required is met by one of the following: • As Built mechanical drawings marked up to show zones; • Sketches of zones/ pipework showing dimensions. • Photographs of pipework.

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	In conjunction with the floor by floor sketches, the evidence required is met

	"Mechanical Supply/Extract" to a zone.	by one of the following: • 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 must be in compliance with the "Non-Domestic Building Services Compliance Guide: 2010" published by CLG in the UK.	The evidence required is met by one of the following: • Photographs of fan nameplates and manufacturer's data sheets; • Sources of efficiency as outlined in Section 6.1; • 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 is met by one of the following: • Photographs of heat recovery unit and manufacturer's data sheets; • Sources of efficiency as outlined in Section 6.1; • 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 is met by one of the following: • 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 is met by one of the following: • As Built mechanical drawings marked up to show zones; • Photos of fan nameplates showing Model number and Flow rate; • Survey Form and photographs.
Do you know the Supply/ Extract SFP?	Assessors must 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 is met by one of the following: • Photographs of fan nameplates and manufacturer's data sheets; • Sources of efficiency as outlined in Section 6.1; • 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	Determine the lamp type for each zone. Where the specific fitting cannot be identified, take the most conservative (highest power density) option from Table 15 of the iSBEM	In conjunction with the floor by floor sketches, the evidence required is met by one of the following: • As Built Electrical Lighting

	User Guide. Refer to Appendix 11 for guidance on selection of lamp type. Refer to Appendix 4 for the details on how Shell and Core buildings are dealt with. Where LED lighting is present and Lighting Parameters are not available, refer to section A4.10 of the NEAP Survey Guide. Where a combination of lighting systems is present in the zone providing general lighting (no display lighting), the zone should be split to reflect the lamp locations. Where a combination of lighting systems is present in the zone providing general lighting (no display lighting) across the entire zone, such that splitting the zone to reflect the lamps location is not practicable (For example the zone contains a combination of fluorescents and down lighters mixed throughout the zone) then the following method is used: • The proportion of the zone's area lit by each lamp type is established. • The zone is split into a number of zones to match the number of lamp types and for each lamp type the relevant proportion of the zone area and all of the zone's envelopes, including glazing should be entered into each relevant zone along with the appropriate respective lamp type.	Drawings marked up to show zones; • Survey Form and photographs of light fittings. Photograph(s) 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 is met by one of the following: • 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 is met by one of the following: • As Built Electrical Lighting Drawings marked up to show zones; • Survey Form and photographs of lighting controls.
Local Manual Switching	Determine if occupants can control the luminaries individually and if light switch is within 6m of the luminaries it controls.	In conjunction with the floor by floor sketches, the evidence required is met by one of the following: • As Built Electrical Lighting Drawings marked up to show zones; • Survey Form and photographs of lighting switches.
Photoelectric Options	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. Establish whether or not the sensor has a photoelectric function, by carrying out on site tests or obtaining technical data sheets detailing the light control functions in each zone.	In conjunction with the floor by floor sketches, the evidence required is met by one of the following: • 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 Operational and Maintenance manuals.
Occupancy Sensing	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 is met by one of the following: • 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 Operational and Maintenance manuals.

iSBEM Software Tab: "Building Services > Zones > Display Lighting"

Data Entry Item	Guidance	Documentary Evidence
Refer to Section 7.6.8 of the iSBEM User Guide	This is the lighting intended to highlight displays of exhibits or merchandise, or lighting used in spaces for public leisure and entertainment such as dance halls, auditoria, conference halls, restaurants and cinemas. Refer to Section A4.11 Display Lighting where zones incorporate an activity where SBEM automatically assumes the presence of display lighting but none is actually present.	In conjunction with the floor by floor sketches, the evidence required is met by one of the following: • 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.

Appendix 1: The NEAP Survey Form

NEAP for NEW-FINAL and EXISTING BUILDINGS SURVEY FORM

Name: _____

Address: _____

_____

MPRN

Assessor / BER reg. no.

Survey Date:

Building Type

Age: Building
- ☐ pre 1900
- ☐ post 2009
- ☐ 1900 - 1929
- ☐ 1930 - 1949
- ☐ 1950 - 1966
- ☐ 1967 - 1977
- ☐ 1978 - 1982
- ☐ 1983 - 1993
- ☐ 1994 - 1999
- ☐ 2000 - 2004
- ☐ 2005 - 2007
- ☐ 2008 - 2009

Age: Extension 1
- ☐ pre 1900
- ☐ post 2009
- ☐ 1900 - 1929
- ☐ no extension 1
- ☐ 1930 - 1949
- ☐ 1950 - 1966
- ☐ 1967 - 1977
- ☐ 1978 - 1982
- ☐ 1983 - 1993
- ☐ 1994 - 1999
- ☐ 2000 - 2004
- ☐ 2005 - 2007
- ☐ 2008 - 2009

Age:Extension 2
- ☐ pre 1900
- ☐ post 2009
- ☐ 1900 - 1929
- ☐ no extension 2
- ☐ 1930 - 1949
- ☐ 1950 - 1966
- ☐ 1967 - 1977
- ☐ 1978 - 1982
- ☐ 1983 - 1993
- ☐ 1994 - 1999
- ☐ 2000 - 2004
- ☐ 2005 - 2007
- ☐ 2008 - 2009

number of storeys ☐

Type of Rating
- ☐ new-final building
- ☐ existing building

Wall construction Main Wall*
- ☐ Cast In-Situ Concrete
- ☐ Cavity Wall, bricks/ blocks
- ☐ Framed/ Curtain Walling
- ☐ Metal Cladding System
- ☐ Pre Cast Concrete Panels
- ☐ Rubble Construction ☐ Timber frame
- ☐ Solid brick or block wall on insitu concrete
- ☐ Weather boarding and tile hung wall
- ☐ Non Default U value ☐ Uninsulated

Roof Construction: Main Roof*
- ☐ flat roofs asphalt on precast or in-situ concrete slab
- ☐ flat roofs asphalt on metal decking on steel frame
- ☐ flat roofs chippings and roofing felt on woodwool or metal decking
- ☐ metal cladding system
- ☐ pitched roofs asbestos cement (or similar) profiled cladding
- ☐ pitched roofs coated profiled metal (steel or aluminium) cladding
- ☐ pitched roofs tile, slate and similar covering
- ☐ room in roof
- ☐ Non Default U value ☐ Uninsulated

Ground Floor Construction: Main Floor*
- ☐ separating floor
- ☐ solid ground floor
- ☐ suspended ground floor
- ☐ Non Default U value ☐ Uninsulated

Ground Floor Construction: Floor Type 2*
- ☐ separating floor
- ☐ solid ground floor
- ☐ suspended ground floor
- ☐ Non Default U value ☐ Uninsulated

Wall construction Wall Type 2*
- ☐ Cast In-Situ Concrete
- ☐ Cavity Wall, bricks/ blocks
- ☐ Framed/ Curtain Walling
- ☐ Metal Cladding System
- ☐ Pre Cast Concrete Panels
- ☐ Rubble Construction ☐ Timber frame
- ☐ Solid brick or block wall on insitu concrete
- ☐ Weather boarding and tile hung wall
- ☐ Non Default U value ☐ Uninsulated

Roof Construction: Roof Type 2*
- ☐ flat roofs asphalt on precast or in-situ concrete slab
- ☐ flat roofs asphalt on metal decking on steel frame
- ☐ flat roofs chippings and roofing felt on woodwool or metal decking
- ☐ metal cladding system
- ☐ pitched roofs asbestos cement (or similar) profiled cladding
- ☐ pitched roofs coated profiled metal (steel or aluminium) cladding
- ☐ pitched roofs tile, slate and similar covering
- ☐ room in roof
- ☐ Non Default U value ☐ Uninsulated

Ground Floor Construction: Floor Type 3*
- ☐ separating floor
- ☐ solid ground floor
- ☐ suspended ground floor
- ☐ Non Default U value ☐ Uninsulated

Ground Floor Construction: Floor Type 4*
- ☐ separating floor
- ☐ solid ground floor
- ☐ suspended ground floor
- ☐ Non Default U value ☐ Uninsulated

Wall construction Wall Type 3*
- ☐ Cast In-Situ Concrete
- ☐ Cavity Wall, bricks/ blocks
- ☐ Framed/ Curtain Walling
- ☐ Metal Cladding System
- ☐ Pre Cast Concrete Panels
- ☐ Rubble Construction ☐ Timber frame
- ☐ Solid brick or block wall on insitu concrete
- ☐ Weather boarding and tile hung wall
- ☐ Non Default U value ☐ Uninsulated

Roof Construction: Roof Type 3*
- ☐ flat roofs asphalt on precast or in-situ concrete slab
- ☐ flat roofs asphalt on metal decking on steel frame
- ☐ flat roofs chippings and roofing felt on woodwool or metal decking
- ☐ metal cladding system
- ☐ pitched roofs asbestos cement (or similar) profiled cladding
- ☐ pitched roofs coated profiled metal (steel or aluminium) cladding
- ☐ pitched roofs tile, slate and similar covering
- ☐ room in roof
- ☐ Non Default U value ☐ Uninsulated

Door Construction: Main Door*
- ☐ vehicle access door
- ☐ personnel door
- ☐ Non Default U value

Door Construction: Door Type 2*
- ☐ vehicle access door
- ☐ personnel door
- ☐ Non Default U value

Wall construction Wall Type 4*
- ☐ Cast In-Situ Concrete
- ☐ Cavity Wall, bricks/ blocks
- ☐ Framed/ Curtain Walling
- ☐ Metal Cladding System
- ☐ Pre Cast Concrete Panels
- ☐ Rubble Construction ☐ Timber frame
- ☐ Solid brick or block wall on insitu concrete
- ☐ Weather boarding and tile hung wall
- ☐ Non Default U value ☐ Uninsulated

Roof Construction: Roof Type 4*
- ☐ flat roofs asphalt on precast or in-situ concrete slab
- ☐ flat roofs asphalt on metal decking on steel frame
- ☐ flat roofs chippings and roofing felt on woodwool or metal decking
- ☐ metal cladding system
- ☐ pitched roofs asbestos cement (or similar) profiled cladding
- ☐ pitched roofs coated profiled metal (steel or aluminium) cladding
- ☐ pitched roofs tile, slate and similar covering
- ☐ room in roof
- ☐ Non Default U value ☐ Uninsulated

Door Construction: Door Type 3*
- ☐ vehicle access door
- ☐ personnel door
- ☐ Non Default U value

Door Construction: Door Type 4*
- ☐ vehicle access door
- ☐ personnel door
- ☐ Non Default U value

**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)*

HVAC System (general information)

MAIN HVAC SYSTEM

HVAC System

- ☐ Central heating using water: radiators
- ☐ Central heating using water: convectors
- ☐ Central heating using water: floor heating
- ☐ Central heating using air distribution
- ☐ Other local room heater - fanned
- ☐ Other local room heater - unfanned
- ☐ Unflued radiant heater
- ☐ Flued radiant heater
- ☐ Multiburner radiant heaters
- ☐ Flued forced-convection air heaters
- ☐ Unflued forced-convection air heaters
- ☐ Single-duct VAV
- ☐ Dual-duct VAV
- ☐ Indoor packaged cabinet (VAV)
- ☐ Fan coil systems
- ☐ Induction system
- ☐ Constant volume system (fixed fresh air rate)
- ☐ Constant volume system (variable fresh air rate)
- ☐ Multizone (hot deck/cold deck)
- ☐ Terminal reheat (constant volume)
- ☐ Dual duct (constant volume)
- ☐ Chilled ceilings or passive chilled beams and displacement ventilation
- ☐ Active chilled beams
- ☐ Water loop heat pump
- ☐ Split or multi-split system
- ☐ Single room cooling system
- ☐ Eligible for ECA/ACA?
- ☐ None

Heating System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Biogas
- ☐ Oil
- ☐ electricity
- ☐ Coal
- ☐ biomass
- ☐ waste heat
- ☐ Anthracite
- ☐ Smokeless Fuel
- ☐ Dual Fuel Appliances
- ☐ other:

Heating System: other info

- ☐ HVAC system uses Variable Speed Pumps
- ☐ System also uses CHP

Heating Source

- ☐ LTHW Boiler
- ☐ MTHW boiler
- ☐ HTHW boiler
- ☐ Direct or storage electric heater
- ☐ Heat pump (gas/oil): air source
- ☐ Heat pump (electric): air source
- ☐ Heat pump (gas/oil): ground/water
- ☐ Heat pump (electric): ground/water
- ☐ District heating
- ☐ Unitary radiant heater
- ☐ Radiant heater
- ☐ Unflued radiant heater
- ☐ Room heater
- ☐ Direct gas firing
- ☐ Room heater
- ☐ Unflued gas warm air heater
- ☐ Air heater

Heating System Age

- ☐ 1998 or later
- ☐ pre 1998

Heating System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Cooling System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Oil
- ☐ Biogas
- ☐ electricity

Cooling Source

- ☐ Air cooled chiller Size: _____ kW
- ☐ Water cooled chiller Size: _____ kW
- ☐ Remote-condenser chiller Size: _____ kW
- ☐ Heat pump (gas/oil)
- ☐ Heat pump (electric)

Mixed Mode Operation

- ☐ Yes
- ☐ No

Cooling System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Ventilation Heat Recovery

- ☐ Plate heat exchanger (Recuperator)
- ☐ Thermal wheel
- ☐ Heat-pipes
- ☐ Run around coil

Heat Recovery Seasonal Efficiency

- ☐ Default
- ☐ Non Default; Efficiency _____

Ductwork Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

AHU Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

Specific Fan Power

- ☐ Default
- ☐ Non Default
  SFP: _____

Aux Energy

- ☐ Default
- ☐ Non Default
  kWh/kWh: _____

HVAC Metering Provision

- ☐ Yes, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, Submetered
- ☐ No, M&T Alarm

Lighting Metering Provision

- ☐ Yes, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, Submetered
- ☐ No, M&T Alarm

HVAC SYSTEM TYPE 2

HVAC System

- ☐ Central heating using water: radiators
- ☐ Central heating using water: convectors
- ☐ Central heating using water: floor heating
- ☐ Central heating using air distribution
- ☐ Other local room heater - fanned
- ☐ Other local room heater - unfanned
- ☐ Unflued radiant heater
- ☐ Flued radiant heater
- ☐ Multiburner radiant heaters
- ☐ Flued forced-convection air heaters
- ☐ Unflued forced-convection air heaters
- ☐ Single-duct VAV
- ☐ Dual-duct VAV
- ☐ Indoor packaged cabinet (VAV)
- ☐ Fan coil systems
- ☐ Induction system
- ☐ Constant volume system (fixed fresh air rate)
- ☐ Constant volume system (variable fresh air rate)
- ☐ Multizone (hot deck/cold deck)
- ☐ Terminal reheat (constant volume)
- ☐ Dual duct (constant volume)
- ☐ Chilled ceilings or passive chilled beams and displacement ventilation
- ☐ Active chilled beams
- ☐ Water loop heat pump
- ☐ Split or multi-split system
- ☐ Single room cooling system
- ☐ Eligible for ECA/ACA?
- ☐ None

Heating System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Biogas
- ☐ Oil
- ☐ electricity
- ☐ Coal
- ☐ biomass
- ☐ waste heat
- ☐ Anthracite
- ☐ Smokeless Fuel
- ☐ Dual Fuel Appliances
- ☐ other:

Heating System: other info

- ☐ HVAC system uses Variable Speed Pumps
- ☐ System also uses CHP

Heating Source

- ☐ LTHW Boiler
- ☐ MTHW boiler
- ☐ HTHW boiler
- ☐ Direct or storage electric heater
- ☐ Heat pump (gas/oil): air source
- ☐ Heat pump (electric): air source
- ☐ Heat pump (gas/oil): ground/water
- ☐ Heat pump (electric): ground/water
- ☐ District heating
- ☐ Unitary radiant heater
- ☐ Radiant heater
- ☐ Unflued radiant heater
- ☐ Room heater
- ☐ Direct gas firing
- ☐ Room heater
- ☐ Unflued gas warm air heater
- ☐ Air heater

Heating System Age

- ☐ 1998 or later
- ☐ pre 1998

Heating System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Cooling System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Oil
- ☐ Biogas
- ☐ electricity

Cooling Source

- ☐ Air cooled chiller Size: _____ kW
- ☐ Water cooled chiller Size: _____ kW
- ☐ Remote-condenser chiller Size: _____ kW
- ☐ Heat pump (gas/oil)
- ☐ Heat pump (electric)

Mixed Mode Operation

- ☐ Yes
- ☐ No

Cooling System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Ventilation Heat Recovery

- ☐ Plate heat exchanger (Recuperator)
- ☐ Thermal wheel
- ☐ Heat-pipes
- ☐ Run around coil

Heat Recovery Seasonal Efficiency

- ☐ Default
- ☐ Non Default; Efficiency _____

Ductwork Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

AHU Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

Specific Fan Power

- ☐ Default
- ☐ Non Default
  SFP: _____

Aux Energy

- ☐ Default
- ☐ Non Default
  kWh/kWh: _____

HVAC Metering Provision

- ☐ Yes, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, Submetered
- ☐ No, M&T Alarm

Lighting Metering Provision

- ☐ Yes, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, Submetered
- ☐ No, M&T Alarm

HVAC System (general information)

HVAC SYSTEM TYPE 3

HVAC System

- ☐ Central heating using water: radiators
- ☐ Central heating using water: convectors
- ☐ Central heating using water: floor heating
- ☐ Central heating using air distribution
- ☐ Other local room heater - fanned
- ☐ Other local room heater - unfanned
- ☐ Unflued radiant heater
- ☐ Flued radiant heater
- ☐ Multiburner radiant heaters
- ☐ Flued forced-convection air heaters
- ☐ Unflued forced-convection air heaters
- ☐ Single-duct VAV
- ☐ Dual-duct VAV
- ☐ Indoor packaged cabinet (VAV)
- ☐ Fan coil systems
- ☐ Induction system
- ☐ Constant volume system (fixed fresh air rate)
- ☐ Constant volume system (variable fresh air rate)
- ☐ Multizone (hot deck/cold deck)
- ☐ Terminal reheat (constant volume)
- ☐ Dual duct (constant volume)
- ☐ Chilled ceilings or passive chilled beams and displacement ventilation
- ☐ Active chilled beams
- ☐ Water loop heat pump
- ☐ Split or multi-split system
- ☐ Single room cooling system
- ☐ Eligible for ECA/ACA?
- ☐ None

Heating System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Biogas
- ☐ Oil
- ☐ electricity
- ☐ Coal
- ☐ biomass
- ☐ waste heat
- ☐ Anthracite
- ☐ Smokeless Fuel
- ☐ Dual Fuel Appliances
- ☐ other:

Heating System: other info

- ☐ HVAC system uses Variable Speed Pumps
- ☐ System also uses CHP

Heating Source

- ☐ LTHW Boiler
- ☐ MTHW boiler
- ☐ HTHW boiler
- ☐ Direct or storage electric heater
- ☐ Heat pump (gas/oil): air source
- ☐ Heat pump (electric): air source
- ☐ Heat pump (gas/oil): ground/water
- ☐ Heat pump (electric): ground/water
- ☐ District heating
- ☐ Unitary radiant heater
- ☐ Radiant heater
- ☐ Unflued radiant heater
- ☐ Room heater
- ☐ Direct gas firing
- ☐ Room heater
- ☐ Unflued gas warm air heater
- ☐ Air heater

Heating System Age

- ☐ 1998 or later
- ☐ pre 1998

Heating System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Cooling System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Oil
- ☐ Biogas
- ☐ electricity

Cooling Source

- ☐ Air cooled chiller Size: _____ kW
- ☐ Water cooled chiller Size: _____ kW
- ☐ Remote-condenser chiller Size: _____ kW
- ☐ Heat pump (gas/oil)
- ☐ Heat pump (electric)

Mixed Mode Operation

- ☐ Yes
- ☐ No

Cooling System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Ventilation Heat Recovery

- ☐ Plate heat exchanger (Recuperator)
- ☐ Thermal wheel
- ☐ Heat-pipes
- ☐ Run around coil

Heat Recovery Seasonal Efficiency

- ☐ Default
- ☐ Non Default; Efficiency _____

Ductwork Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

AHU Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

Specific Fan Power

- ☐ Default
- ☐ Non Default
  SFP: _____

Aux Energy

- ☐ Default
- ☐ Non Default
  kWh/kWh: _____

HVAC Metering Provision

- ☐ Yes, Submetered
- ☐ No, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, M&T Alarm

Lighting Metering Provision

- ☐ Yes, Submetered
- ☐ No, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, M&T Alarm

HVAC SYSTEM TYPE 4

HVAC System

- ☐ Central heating using water: radiators
- ☐ Central heating using water: convectors
- ☐ Central heating using water: floor heating
- ☐ Central heating using air distribution
- ☐ Other local room heater - fanned
- ☐ Other local room heater - unfanned
- ☐ Unflued radiant heater
- ☐ Flued radiant heater
- ☐ Multiburner radiant heaters
- ☐ Flued forced-convection air heaters
- ☐ Unflued forced-convection air heaters
- ☐ Single-duct VAV
- ☐ Dual-duct VAV
- ☐ Indoor packaged cabinet (VAV)
- ☐ Fan coil systems
- ☐ Induction system
- ☐ Constant volume system (fixed fresh air rate)
- ☐ Constant volume system (variable fresh air rate)
- ☐ Multizone (hot deck/cold deck)
- ☐ Terminal reheat (constant volume)
- ☐ Dual duct (constant volume)
- ☐ Chilled ceilings or passive chilled beams and displacement ventilation
- ☐ Active chilled beams
- ☐ Water loop heat pump
- ☐ Split or multi-split system
- ☐ Single room cooling system
- ☐ Eligible for ECA/ACA?
- ☐ None

Heating System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Biogas
- ☐ Oil
- ☐ electricity
- ☐ Coal
- ☐ biomass
- ☐ waste heat
- ☐ Anthracite
- ☐ Smokeless Fuel
- ☐ Dual Fuel Appliances
- ☐ other:

Heating System: other info

- ☐ HVAC system uses Variable Speed Pumps
- ☐ System also uses CHP

Heating Source

- ☐ LTHW Boiler
- ☐ MTHW boiler
- ☐ HTHW boiler
- ☐ Direct or storage electric heater
- ☐ Heat pump (gas/oil): air source
- ☐ Heat pump (electric): air source
- ☐ Heat pump (gas/oil): ground/water
- ☐ Heat pump (electric): ground/water
- ☐ District heating
- ☐ Unitary radiant heater
- ☐ Radiant heater
- ☐ Unflued radiant heater
- ☐ Room heater
- ☐ Direct gas firing
- ☐ Room heater
- ☐ Unflued gas warm air heater
- ☐ Air heater

Heating System Age

- ☐ 1998 or later
- ☐ pre 1998

Heating System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Cooling System Fuel

- ☐ mains gas
- ☐ LPG
- ☐ Oil
- ☐ Biogas
- ☐ electricity

Cooling Source

- ☐ Air cooled chiller Size: _____ kW
- ☐ Water cooled chiller Size: _____ kW
- ☐ Remote-condenser chiller Size: _____ kW
- ☐ Heat pump (gas/oil)
- ☐ Heat pump (electric)

Mixed Mode Operation

- ☐ Yes
- ☐ No

Cooling System Efficiency

- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Ventilation Heat Recovery

- ☐ Plate heat exchanger (Recuperator)
- ☐ Thermal wheel
- ☐ Heat-pipes
- ☐ Run around coil

Heat Recovery Seasonal Efficiency

- ☐ Default
- ☐ Non Default; Efficiency _____

Ductwork Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

AHU Leakage

- ☐ Default
- ☐ Non Default
  Class: _____

Specific Fan Power

- ☐ Default
- ☐ Non Default
  SFP: _____

Aux Energy

- ☐ Default
- ☐ Non Default
  kWh/kWh: _____

HVAC Metering Provision

- ☐ Yes, Submetered
- ☐ No, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, M&T Alarm

Lighting Metering Provision

- ☐ Yes, Submetered
- ☐ No, Submetered
- ☐ Yes, M&T Alarm
- ☐ No, M&T Alarm

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

Heating system (Hot Water System)

Generator Type
- ☐ Dedicated hot water boiler
- ☐ Stand-alone water heater
- ☐ Instantaneous hot water only
- ☐ Instantaneous combi
- ☐ Heat pump
- ☐ Same as HVAC: _____

HWS System Fuel
- ☐ mains gas
- ☐ LPG
- ☐ Biogas
- ☐ Oil
- ☐ electricity
- ☐ Coal
- ☐ biomass
- ☐ waste heat
- ☐ other:

HWS System Age
- ☐ 1998 or later
- ☐ pre 1998

HWS System Efficiency
- ☐ Default
- ☐ Non Default

Manufacturer / make / model number

Hot Water Cylinder Storage System
- ☐ no access
- **Insulation:** ☐ no insulation ☐ lagging jacket ☐ factory fitted
- ☐ storage losses
- ☐ capacity (litres) or dimensions
- ☐ insulation thickness (mm)
- ☐ MJ/month

Secondary Circulation
- ☐ circulation losses (W/m) _____
- ☐ pump power (kW) _____
- ☐ loop length (m) _____
- ☐ time control on secondary circulation

Solar Water Heating

Collector Parameters
- ☐ none
- ☐ solar water heating present
- ☐ aperture panel area (m^2)
- ☐ orientation
- ☐ tilt °
- ☐ evacuated tube
- ☐ flat plate, glazed
- ☐ Unglazed
- ☐ Non Default

Manufacturer / make / model number

Solar Storage
- ☐ solar storage volume (litres)
- ☐ combined cylinder ☐ separate cylinder
- ☐ no insulation ☐ lagging jacket ☐ factory fitted
- ☐ insulation thickness (mm)

Collector Loop

Heat Transfer Rate of Heat Exchanger
- ☐ no heat exchanger
- ☐ default
- ☐ non default _____

Heat Loss Coeff of all Pipes
- ☐ default
- ☐ non default _____

Photovoltaics

Parameters
- ☐ none
- ☐ photovoltaics present
- ☐ aperture panel area (m^2)
- ☐ orientation
- ☐ tilt °
- ☐ Monocrystalline silicon
- ☐ Policrystalline silicon
- ☐ Amorphous silicon
- ☐ Other thin films

Manufacturer / make / model number

Wind Generator

Parameters
- ☐ none
- ☐ turbine present
- ☐ Smooth flat country (no obstacles)
- ☐ Farm land with boundary hedges
- ☐ Suburban or industrial area
- ☐ Urban with average building height > 15m
- ☐ horizontal axis, m
- ☐ Swept Area, m2
- ☐ height,m
- ☐ power,kW

Manufacturer / make / model number

CHP

Parameters
- ☐ none
- ☐ chp present
- ☐ tri generation present

Fuel
- ☐ mains gas
- ☐ LPG
- ☐ Biogas
- ☐ Oil
- ☐ Coal
- ☐ biomass
- ☐ Anthracite
- ☐ Smokeless Fuel
- ☐ Dual Fuel Appliances

Efficiency
- ☐ Heat Efficiency
- ☐ Electrical Efficiency

Heat Supplied
- ☐ Building Space Heat Supplied, %
- ☐ Building Hot Water Supplied, %

Tri Generation
- ☐ Building Cooling Supplied, %
- ☐ Chiller Efficiency

CHP Manufacturer / make / model number

Chiller Manufacturer / make / model number

Any other comments or details on assessment including items observed which affect the rating but not shown elsewhere on survey form/sketches.

Reprint this page if multiple CHP, DHW, Solar, PV or Wind systems present

ZONES: BUILDING SERVICES DETAILS

Zone name	Description	Building type	Activity#	Area m2	Height m	No.corners	Which HVAC system*?	Zonal ventilation type (supply)	Mechanical exhaust?	Mechanical supply and/or exhaust ACH	Infiltration permeability @50Pa	DHW generator name	DHW deadleg length m	Lighting: What information	Total W lumens/ W lamp type	Display high eff.lamps	Air extract luminaires	Lighting controls Manual Photelec	If photo switching or dimming	Back sensor y/n?	Occupancy sensing	Time switch none/ dim/sw
Copy Format Above for other zones																						

ZONES: GEOMETRICAL DETAILS

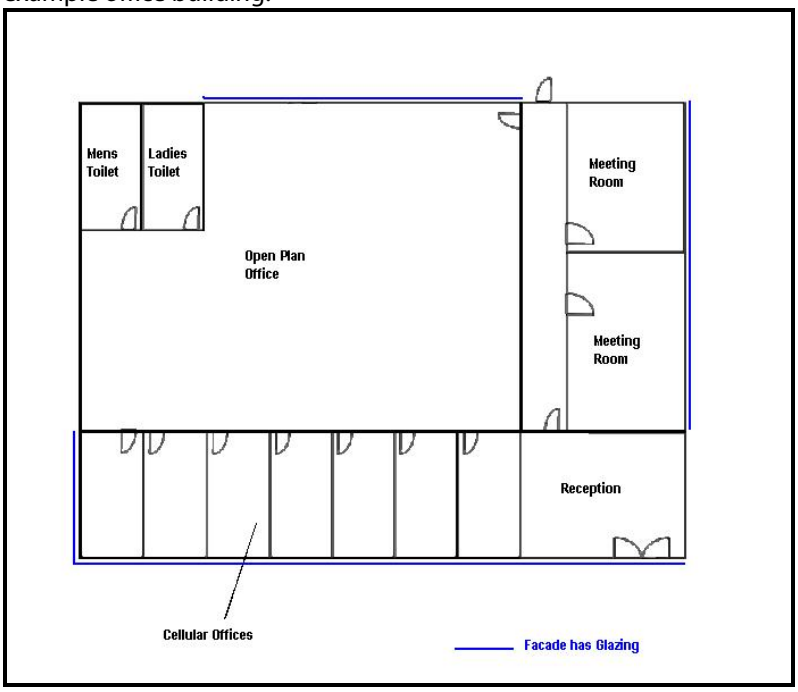
Adjacent spaces: CAS= Conditioned adjoining space; Ext=Exterior, Und=Underground, Unheat=Unheated adjoining space
Shading type: ALC=All other cases, User=Ext. solar protection. User moveable, Auto=Ext. solar protection with automatic control.

Basic zone information								Envelope elements							windows and doors			window only						doors only
Zone name	Description	Building type	Activity#	Area m2	Height m	No corners	HVAC system	Element name$	Wall/roof (flat or not)/ floor	Orientation NESWH	Adjacent space	Construction name*	Length (walls only-not for iSBEM)	Area m2	Window name/Door name$	Glazing/door construction name*	Area m2	or % glazed (instead of area)	Frame Type	Window Width/ Gap Width	Gap Gas	Shading type	Transmission factor	Type of door
z-/--																								
z0/02																								
z0/03																								
z0/04																								

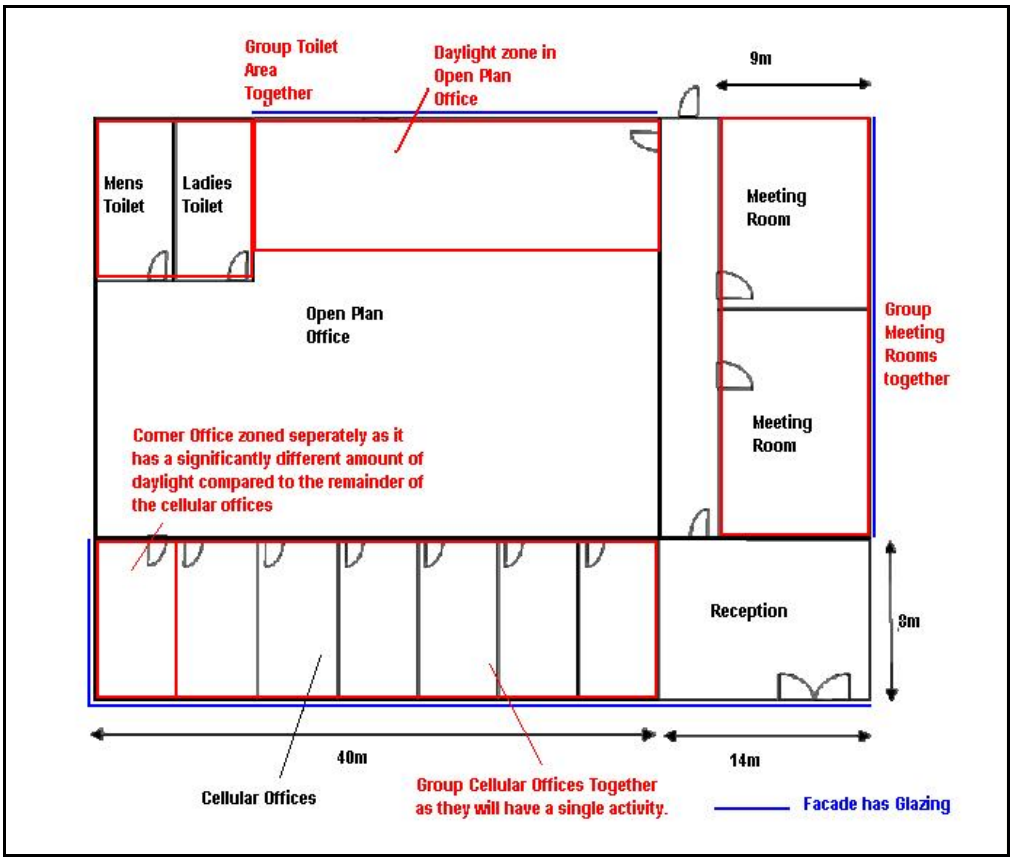
Copy the above format for any further zones; Copy lines in each zone for additional elements.
Zones can be merged prior to entry on survey form (subject to SBEM rules).
Survey Form Version 1.0.....Q3 2011

Appendix 2: Zoning Example

Assessors must adhere to 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.
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 with thermal mass must be included within the model. The $\mathbf{k_m}$ values determine how the building retains and emits heat, and hence they must be defined in iSBEM. You can sum the areas of two or more internal walls (between merged zones) with the same construction, adjoining condition 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	
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																			

Food preparation area		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x			x			x	
Hall/lecture theatre/assembly area			x	x			x	x		x	x			x	x	x	x	x		x									
Laboratory			x	x			x										x								x				
Waiting room				x	x		x									x		x			x	x							
Consulting room				x	x		x									x		x											
Operating theatre							x																						
Patient accomodation (wards)							x																						
Bathroom				x		x	x	x										x	x										
Bedroom				x		x	x	x																					
Eating/drinking area		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x			x	
Sales area - general											x	x					x				x								
Sales area -chilled												x									x								
Storage - chilled							x					x	x								x		x		x			x	
Display area								x			x	x		x			x				x							x	
Performance area (stage)				x					x		x			x															
Plant room	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	
Workshop - small scale			x	x							x	x	x	x	x	x	x	x	x				x		x			x	
Industrial process area							x																		x				
Cell (police/prison)																		x	x	x									
High density IT work space	x		x	x									x								x			x					
IT equipment	x		x	x			x						x						x		x			x					x
Laundry				x		x	x	x		x								x								x			
Common room/staff room/lounge	x	x	x	x	x	x	x	x		x	x	x	x			x	x	x	x		x			x	x			x	
Security check area																					x								

Baggage reclaim area																					x								
Check-in area																					x								
Circulation (public areas)							x					x		x			x				x	x						
Warehouse storage													x										x		x				
Warehouse storage - chilled													x										x		x				
Domestic lounge																											x		
Domestic kitchen																											x		
Domestic toilets																											x		
Domestic dining room																											x		
Domestic bathroom																											x		
Domestic bedroom																											x		
Domestic circulation																											x		
Warehouse sales - general																												x	
Warehouse sales - chilled																												x	
Warehouse sales - electrical																												x	
Fitness suite/gym	x			x				x		x	x				x			x										
Fitness studio										x	x																		
Sales area - electrical												x																	
Ice rink										x																			
Classroom		x	x	x														x											
Hydrotherapy Pool							x																						
Storage area - cold room (<0oC)							x	x	x			x	x								x				x			x	
Intensive care/high dependency							x																						
Diagnostic Imaging							x																						

Ward offices							X																							
Ward staff room/day room/lounge							X																							
A&E consulting/treatment							X																							
Physiotherapy							X																							
Speculative office	X																													
Speculative retail space												X									X								
Speculative industrial space													X										X		X				
Post Mortem							X																							
Day Patient Accommodation							X																							
Data centres																														X
Common circulation areas																											X			

Appendix 4: Default Data

This section outlines defaults to be used for non-domestic BERs in the absence of evidence supporting non-default data. Actual data must be used where acceptable evidence is available.

A4.1 Age of Building

The Age of Building/ Year of Construction is used to identify the appropriate default U-values for construction elements based on the relevant building regulations.

Note on use of defaults:

1) Buildings constructed **prior** to the introduction of Building Regulations in 1992 were not required to have insulation; therefore the Assessor must demonstrate that insulation is present when selecting "Pre 1991" options for external elements. "Pre 1991" assumes a certain amount of insulation is present. If unable to demonstrate that insulation is present in "Pre 1991" buildings, "No date – Uninsulated" must be used for external elements from "Help with Inference procedures".

2) Buildings constructed **after** the introduction of Building Regulations in 1992 were required to have insulation, therefore select relevant building regulations for external elements from "Help with Inference procedures", except where the element is known to be uninsulated. In this case, select "No date – Uninsulated" from "Help with Inference procedures".

3) For internal elements, irrespective of the adjoining condition, select "No date – Uninsulated" irrespective of the age of the building, unless able to demonstrate that insulation is present. In this case, calculate the U-value by adding the insulation resistance to the default U value for the element without insulation. The internal element U-value is adjusted as per Appendix 8 if adjoining an unconditioned space.

In all cases, the U-value can be calculated using full details of all the layers (where thicknesses and thermal properties are known).

iSBEM Software Tab: "Project Database "	
Year of Construction	**Relevant Building Regulations and selecting defaults.**
Pre 1994 (external elements)	"No date – Uninsulated" –is selected unless the element is proven to be insulated. Pre 1991 –where element is proven to be insulated.
1994 to 1999 (external elements)	1992 Building Regulations or, "No date – Uninsulated" – where element is known to be uninsulated.
2000 to 2004 (external elements)	1997 Building Regulations or, "No date – Uninsulated" – where element is known to be uninsulated.
2005 to 2007 (external elements)	2002 Building Regulations or, "No date – Uninsulated" – where element is known to be uninsulated.
2008 to 2009 (external elements)	2006 Building Regulations or, "No date – Uninsulated" – where element is known to be uninsulated.

Post 2009 (external elements)	2007 Building Regulations or, "No date – Uninsulated" – where element is known to be uninsulated.
Internal Elements	"No date – Uninsulated" – unless proven to be insulated.

A4.2 Constructional Types

The Help with Inference procedures is the main source of default data for external elements, the Library database may be used if it is more representative of the construction.

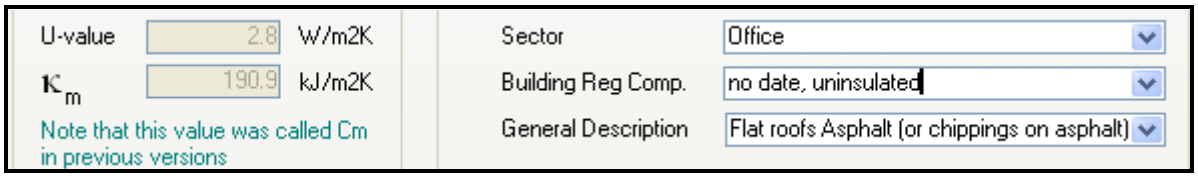
iSBEM Software Tab: "Project Database"	
Data Entry Item	**Default Value**
Construction for Floors	Select from "Help with Inference procedures" within iSBEM software. If known to be uninsulated, internal or constructed pre 1994, select "uninsulated" option. "Import one from the library" may be used where the detail in the library database is more representative of the construction than that given in the inference procedure. For Internal Floors/ Ceiling select from "Import one from the library" as the database is more representative of the construction.
Construction for Walls	
Construction for Roofs	
Construction for Doors	

Glazing	The survey process provides information on window area, glazing type, age, frame type and orientation. If unable to determine whether double glazing is Low "E" or not, assume that double glazing installed before 2004 is not Low "E" and during or after 2004 is Low "E". Assume that double or triple glazing is air filled unless documentary evidence is provided to substantiate an alternate. The gap between double and triple glazing panes must be assumed as 6mm unless measured as otherwise (accounting for pane thickness of 4mm where necessary). Select from "Import one from the library" within iSBEM software. Glazing Type is selected from the Glazing Library Frame Type is selected from the Frame Library: • Where possible, select the age appropriate frame for the frame type. For an Aluminum Frame, select the age appropriate frame. For example, an aluminum frame installed in 1999, is identified as Frame, 1995-2001. • PVC and Softwood Window Frames are not aged profiled. Therefore, select the most conservative applicable option where no supporting evidence is available to support alternate construction. o For PVC Window Frames the most conservative option is "Plastic frame, 2 hollow chambers, metal spacer". o For Softwood Window Frames the most conservative option is "Wood frame, metal spacer"

The following examples demonstrate use of the methodology in determining the construction type for various elements:

Example 1: Roof

The building was constructed in 1975 with a precast concrete flat roof. Following the guidance above the assessor uses the "Help with Inference procedures" to select the following roof:



"No date, uninsulated" is selected because the building was constructed prior to 1994 and there is no evidence of insulation.

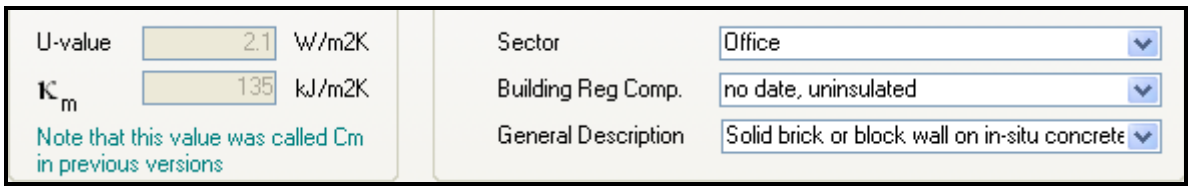
Example 2: External Wall

The building was constructed in 2002 with a cavity wall system. Following the guidance above the assessor uses the "Help with Inference procedures" to select the following external wall:

"Republic of Ireland (1997)" is the relevant building regulation as per the above table. This is selected because the building was constructed post the introduction of building regulations and is therefore assumed to have insulation.

Example 3: Solid Brick Internal Wall

The building was constructed in 2010. The internal walls were constructed of 215mm solid bricks. Following the guidance above the assessor uses the "Help with Inference procedures" to select the following wall:



"No date, uninsulated" is selected as the wall is an internal element. It is assumed that no insulation is present unless the Assessor can demonstrate otherwise.

Example 4: Internal Stud Partition

The building was constructed in 1995. The internal walls were constructed of a stud partition. Following the guidance above the assessor uses the "Help with Inference procedures" to select the following wall:

"No date, uninsulated" is selected as the wall is an internal element. It is assumed that no insulation is present unless the assessor can demonstrate otherwise.

Note: The default U value for lightweight partition walls in iSBEM has a very low U value and does not represent an uninsulated stud partition wall and therefore should not be used unless the assessor can demonstrate that insulation is present.

Example 5: Vehicle Access Door

The building was constructed in 2005. Following the guidance above the assessor uses the "Help with Inference procedures" to select the following door:

"Republic of Ireland (2002)" is the relevant building regulation as per the above table. This is selected because the building was constructed post the introduction of building regulations and is therefore assumed to have insulation.

A4.3 HVAC System Defaults

In some zones, a default HVAC system must be specified. Further Guidance is given in Appendix 7 through the use of flow charts in helping identify the use of default HVAC systems.

Default HVAC systems are applied to zones meeting the following criteria:

- There is no fixed heating installed;
- There are floor and ceiling finishes, lighting, and ventilation as appropriate;
- The Activity Type requires conditioning;
- There is no proposal to fit out the zone with services in the future;
- Not considered transient, indirectly heated spaces or spaces heated by a process load.

Section 7.5.3 of the iSBEM user guide states "If a zone is defined as having no heating or cooling, i.e., assigned to 'Zones without HVAC system', but the activity type selected for the zone is one which typically requires conditioning (according to the Activity Database), a red exclamation mark "**!**"appears next to this parameter as a warning to the user, in case this was done in error."

When assuming a default HVAC system following the guidance above and Appendix 7, use the following table:

iSBEM Software Tab: "HVAC"	
Data Entry Item	**Default Value**
No evidence of a HVAC present	The default HVAC systems for buildings are as follows: 1. '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. Selected when **no** non-electrical fuels are present. 2. "Heating only - Other systems' - Assumed to be wet radiator system, heat generated by fuel combustion. This is applied where the building also has a fuel source other than electricity installed. 3. '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. 4. If no HVAC system serves a zone (ie an unconditioned zone in SBEM) select "Zone without HVAC system". This is only in the case where it has been justified that a HVAC system is **not** required in the zone in the NEAP assessment. For details Refer to 7.5.3 of the iSBEM User Guide.

The following table outlines examples of when various default HVAC systems apply following the guidance above:

Default HVAC System	**Building Condition**	**Zone Conditions**

Heating only - Electric resistance	No alternate (e.g. gas/oil) fuel present in the building.
	
	Electricity may or may not be connected to the building.
		• Zone Activity requires heating (as highlighted by the red exclamation mark in SBEM), for example:
		Offices, Meeting Rooms, Laboratory, Consulting Room, Sales Area, Performance Area, Classroom
		Does not include unheated transient, indirectly heated spaces or spaces heated by a process load.
		• While the zone activity requires heating, the zone is also capable of being naturally ventilated and therefore there is no requirement for cooling. The zone also lends itself to meeting CIBSE Guide A and the Building Regulations for naturally ventilated spaces. The CIBSE Guide A Section 1.4.2.5 and Building Regulation requires that in the absence of mechanical cooling or mechanical ventilation, the space temperature will not exceed 28^{0}C for an unacceptable proportion of the period of occupation. The zone would be expected to achieve adequate natural ventilation following Building Regulation/ CIBSE requirements under the following circumstances:
		  • Internal load is not excessive, and
		  • Space can be naturally ventilated for example:
		  • Zones not deeper than 7m for single side ventilation and 14m for cross ventilation
		  • Sufficient natural ventilation openings e.g. openable windows, doors (approximately 5% of floor area)

Default HVAC System	Building Condition	Zone Conditions
Heating only - Other systems	Alternate fuel present in the building, for example: • Natural Gas pipework connected to building, whether meter evident or not. • Oil Tank Present and connected to building • LPG Tank Present and connected to building • Solid Fuel Store Present appropriate size to heat building.	• Zone Activity requires heating (as highlighted by the red exclamation mark in SBEM, for example: **Offices, Meeting Rooms, Laboratory, Consulting Room, Sales Area, Performance Area, Classroom** Does not include unheated transient, indirectly heated spaces or spaces heated by a process load. • While the zone activity requires heating, the zone is also capable of being naturally ventilated and therefore there is no requirement for cooling. The zone also lends itself to meeting CIBSE Guide A and the Building Regulations for naturally ventilated spaces. The CIBSE Guide A Section 1.4.2.5 and Building Regulation require that in the absence of mechanical cooling or mechanical ventilation, the space temperature will not exceed 28^{0}C for an unacceptable proportion of the period of occupation. The zone would be expected to achieve adequate natural ventilation following the Building Regulation/ CIBSE requirements under the following circumstances: • Internal load is not excessive, and • Space can be naturally ventilated for example: • Zones not deeper than 7m for single side ventilation and 14m for cross ventilation • Sufficient natural ventilation openings e.g. openable windows, doors (approximately 5% of floor area)

Default HVAC System	Building Condition	Zone Conditions
Heating and mechanical cooling	Alternate fuel present in the building **and** where cooling is required, for example: • Natural Gas pipework connected to building, whether meter evident or not. • Oil Tank Present and connected to building • LPG Tank Present and connected to building • Solid Fuel Store Present appropriate size to heat building. Where no alternate fuel is present in the building but it is proven that cooling is required, "Natural Gas" is selected as the heating fuel. Currently electricity is not available as a heating fuel for the default system, "Natural Gas" is selected as it is the heating fuel used in the notional building.	• Zone Activity requires climate control during summer and it is not possible to naturally ventilate, for example: **Offices, Meeting Rooms, Laboratory, Consulting Room, Sales Area, Performance Area, Classroom** Does not include unheated transient, indirectly heated spaces or spaces heated by a process load.

Transient zones
Some unheated zones have a transient/ passing occupancy such as toilets, changing facilities or tea making facilities. For transient zones, where "Zones without HVAC system" is selected, it is acceptable for the red exclamation mark"**!**" to appear. There are further details on transient spaces in the SBEM Technical Manual table "List of Activity areas with definitions" and Table A7.2 of this survey guide.

Indirectly conditioned zones
As outlined in section 7.6.8 of the iSBEM user guide, zones "which are not serviced by a HVAC system, i.e. have no direct supply of heating or cooling, but are likely to be indirectly conditioned by the surrounding areas due to the high level of interaction with those spaces (allowing the heated air to move freely from the directly conditioned spaces to the indirectly conditioned ones), they must be considered heated or conditioned (indirectly) by the same HVAC system that supplies the most important surrounding area".

An unconditioned enclosed zone is not considered as "indirectly conditioned" as air cannot move freely from a directly conditioned zone to the unconditioned zone. See Table A7.2.

A4.4 HWS System

iSBEM Software Tab: "HWS"	
Data Entry Item	**Default Value**
No evidence of a Hot Water System present	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. 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" HWS System Storage/ Secondary Circulation Losses: Not present The iSBEM User Guide Section 7.6.8 states that "Depending on the activity and building type selected for the zone, a standard hot water demand is assumed. For example, there is a demand assumed to arise from the occupants of an office for activities such as washing hands and washing up cups. This demand is associated with the office rather than the toilet or tea room."
Hot Water Storage system insulation if not accessible	The insulation thickness is based on the age of the storage unit as below: If the age of the storage unit is unknown, it must be assumed that the storage unit is the same age as the building. Pre 1993: No Insulation 1994 to 1999: 25mm Factory Insulated Post 1999: 35mm Factory Insulated

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: - panel aperture area 3 m^2 ; - 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: - PV area is roof area for heat loss, times percent of roof area covered by PVs, and if pitched roof divided by cos(35°) ; - Type: Amorphous silicon; - facing South, pitch 30°.

A4.7 Wind Turbine

iSBEM Software Tab: "Wind generators"	
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: - 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 are 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 BER as there is an expectation that energy will be used to condition the indoor climate.

The BER of a Shell and Core building is 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 are 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: Select default system "Heating and Mechanical Cooling" which is based on Terminal reheat (constant volume) and air cooled chiller. Where no alternate fuel is present in the building, "Natural Gas" is selected as the heating fuel. Currently electricity is not available as a heating fuel for the default system, "Natural Gas" is selected as it is the heating fuel used in the notional building. A HVAC system is assigned to every zone where the activity type selected for the zone is one which typically requires conditioning (according to the Activity Database), and a red exclamation mark "!"appears. HWS System: "Instantaneous Hot Water only" is 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: Select default system "Heating and Mechanical Cooling" which is based on "Terminal reheat (constant volume)" with fuel type as available on site for heating. Air cooled chiller used for cooling. A HVAC system is assigned to every zone where the activity type selected for the zone is one which typically requires conditioning (according to the Activity Database), and a red exclamation mark "**!**"appears. HWS System: "Dedicated Hot Water Boiler" is 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

The type of rating published for Shell and Core Buildings must follow the same guidelines as any other building, namely:

1. New Building – Provisional Rating: A rating published on the basis of the plans and specifications for a proposed construction.
2. New Building – Final Rating: A rating published for a building where construction is complete and has not been sold or occupied previously.
3. Existing Building – Final Rating: A rating published for a building where construction is complete and it has been sold or occupied previously.

As per the Code of Practice, BER Assessors are required to carry out a full building survey where an Existing or New Final BER certificate is being published. In the case of Shell and Core buildings this may be just verifying that no services are installed along with collecting other data such as dimensions.

If there is any material change to the data in the BER assessment such as fabric, services for heating, hot water, mechanical ventilation or air conditioning, the original BER certificate is no longer valid. This applies to all buildings – not just shell and core buildings.

Zones that are a shell

A "Shell" would typically be a zone where only the bare structure is in place, internal fittings such as flooring and ceiling finishes, lighting, heating, cooling or ventilation have yet to be installed. For example a retail unit to be fitted out at a later date by a tenant. The default values in the table above are applied to zones that are a shell. Once the zone has been fitted out the BER certificate may no longer be valid if there is a material change in the building affecting the energy performance.

Zone Activity

Typically Shell and Core zones would be office, retail or industrial spaces. In these cases the Assessor should assign the appropriate activity to the zone:

Zone Type	Zone Activity
Shell and Core Office	Speculative office
Shell and Core Retail	Speculative retail
Shell and Core Industrial	Speculative industrial space

There may be some circumstances where these activities are not appropriate for the building type. In such cases the Assessor should select the most appropriate activity type for the building.

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/m^2; or
- a non-residential agricultural building where the installed heating capacity does not exceed 10 W/m^2

However if the building is unheated and does not comply with the above guidelines, a BER assessment is required. Further Guidance is given in Appendix 7 through the use of flow charts and matrices in helping identify the application of unheated building or zones. One such example would be a building with no installed HVAC due to high internal or process loads. iSBEM must have a heating system applied to a zone in the building in order for the software to operate.

When carrying out a BER on an unheated building, 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.

As outlined in the iSBEM User Guide Section 2.3, the notional building heating system is based on the following parameters:

- The efficiency in the notional building is identical to the reference building used for building regulation compliance.
- The space heating is always met by a gas fired system.

Check that the efficiency of the heating system matches the reference building and hence the notional building in the BRIRL - Output Document described under section 8.2.2 of the iSBEM User Guide. Refer to the HVAC Systems Performance section of that iSBEM output as per the diagram below.

Note: The actual Heat SSEEF entry (the heating system seasonal efficiency) must equal the reference Heat SSEEF. If ventilation or exhaust has been added to a zone, the auxiliary energy may differ. To ensure that the heating system is set up correctly, turn off all ventilation and exhausts in the iSBEM zones. Then check that the "Aux con" (auxiliary energy) for the actual building matches the "Aux con" for the reference building. Once this is confirmed turn on the ventilation and exhaust in the zones as appropriate and run the final BER.

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Grid Supplied Electricity									
Actual				0	2	0.73	0	0.78	0
Reference				0	2	0.73	0	----	----

A4.10 LED Lighting

iSBEM Software Tab: "Zones / Lighting (General) "	
Data Entry Item	**Default Value**
Lighting parameters not available for LED system	The UK iSBEM User Guide (Table 15) equates LEDs to "T8 Fluorescent – halophosphate – low frequency ballast" lighting. As there currently is no default for LEDs in Irish iSBEM, LEDs are therefore assumed to have an equivalent lumen per circuit watt as a "T8 Fluorescent - halophosphate - low frequency ballast" where the lighting parameters are not available: Select "Lighting Parameters not available" Select "T8 Fluorescent - halophosphate - standard ballast"

A4.11 Display Lighting

iSBEM Software Tab: "Zones / Display Lighting "	
Data Entry Item	**Default Value**
Zones incorporate an activity whereby SBEM automatically assumes the presence of display lighting but none is actually present.	Where zones incorporate an activity whereby SBEM automatically assumes the presence of display lighting but none is actually present, the display lighting efficiency for SBEM is entered based on the general lighting present in that zone. Where possible this should be calculated, but as this requires detailed measurements of the lumen (lm) and circuit watt (cW) this is not usually practical in existing buildings. The following 'default' values are used in the absence of more detailed information: 1. For all general lamp types except Tungsten or Tungsten Halogen, enter that the display lighting uses efficient lamps and enter 50lm/cW in the relevant "Lumens per circuit wattage" box. 2. For Tungsten or Tungsten Halogen general lamps; enter that the display lighting **does not** use efficient lamps. In this case, a "Lumens per circuit wattage" entry is not required.

A4.12 Non Default K_m Value

A non-default $\mathbf{k^m}$ value (kJ/m^{2}K) is based on the makeup of the construction. As outlined in the iSBEM User Guide, the $\mathbf{k^m}$ value is calculated as follows:

$\mathbf{k^m}$ value = density (kg/m3) x thickness (m) x specific heat capacity (kJ/(kgK))

Starting from the layer of the construction closest to the space (interior), add the values together until <u>any one</u> of the following conditions is satisfied:

- The sum of the layer thicknesses has reached 0.1m,
- You have reached the mid point of the construction or
- You have reached an insulating layer (has a conductivity of 0.08 W/mK or less)

Details of the density for common building materials can be obtained from Building Regulation TGD L – Buildings Other Than Dwellings (Table A1) or from CIBSE Guide A. Details of specific heat capacity for common building materials can be obtained from CIBSE Guide A or from the table below:

Material	**Specific Heat Capacity (J/(kgK))**
Clay Brickwork	1000
Concrete Block	1000

Material	**Specific Heat Capacity (J/(kgK))**
Cast Concrete	1000
Aerated Concrete Slab	1000
Concrete Screed	1000
Reinforced Concrete	1000
Mortar	920
External Render	1000
Plaster/ Plasterboard	1000
Natural Slate	840
Clay Tiles	840
Asphalt	920
Felt Bitumen layers	1700
Timber	1600
Wood	1700

The following shows an example of how to calculate the $\mathbf{k^m}$ value for an external wall:

The wall consists of the following construction layers:

Layer (Inner to Outside)	**d (mm)**	**Conductivity**	**Density**	**Specific Heat Capacity**
Plasterboard	13	0.18	600	1000
Concrete block (dense)	100	1.130	2000	1000
insulation	75	0.040	20	1450
Air Gap	50			
Brick outer leaf	105	0.770	1700	1000

As outlined in the iSBEM User Guide, the $\mathbf{k^m}$ value is calculated until the sum of layers equals 0.1m or an insulating layer is met, in this case the $\mathbf{k^m}$ value is as follows:

600 x 0.013 x (1000/ 1000) = 7.8
2000 x (0.1 – 0.013[†]) x (1000/1000) = 174
$\mathbf{k^m}$ value 181.8

[†] The 0.1m thickness is reached

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

Assessors must be competent in the use of the Non Domestic Building Services Compliance Guide. This Compliance Guide outlines how seasonal efficiency is calculated for various heating and cooling systems in buildings and how credits are applied to increase the efficiency of different systems. Credits are usually applied based on additional controls installed in the system. 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 % efficiency at boiler outputs of		Boiler % output at system outputs of			Boiler % efficiency at system outputs of		
Boiler No	Rating kW	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 % efficiency at boiler outputs of		Boiler % output at system outputs of			Boiler % efficiency at system outputs of		
Boiler No	Rating kW	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: $\frac{15\% \times \text{Heating Load (200kW)}}{\text{Boiler 1 Load (150kW)}} = 20\%$

2. Calculated based on the following: Heating Load (200kW) – Boiler 1 Load (150kW) = 33%
   Boiler 2 Load (150kW)

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 is calculated as follows:

		Chiller efficiency at chiller outputs of		Chiller % output at system outputs of				Chiller % efficiency at system outputs of			
Chiller	Chiller kW	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:

- 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.

  $eer_{75\%}$ = 375/ ((250*100%/2.5) + (250*50%/3.5))

= 2.76

- Calculated as the weighted average;

  = 0.25* 3.5 + 0.25 * 2.5 + 0.25 * 2.76 + 0.25 * 2.5

  = 2.815

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:

= Boiler Efficiency + maximum of 4 heating efficiency credits

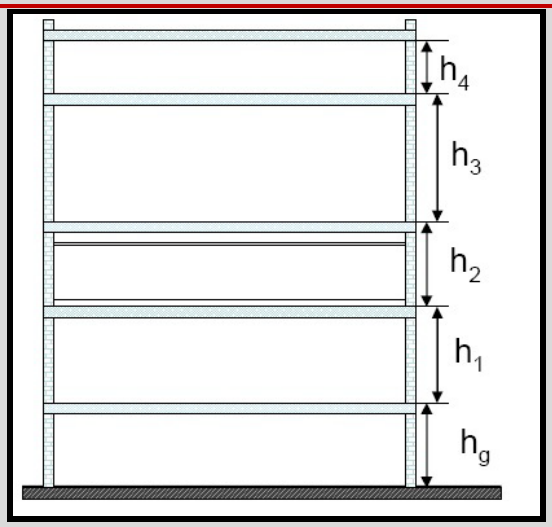
= 82% + 3%

= **85%**

Appendix 6: Determining Zone Heights and U-Values

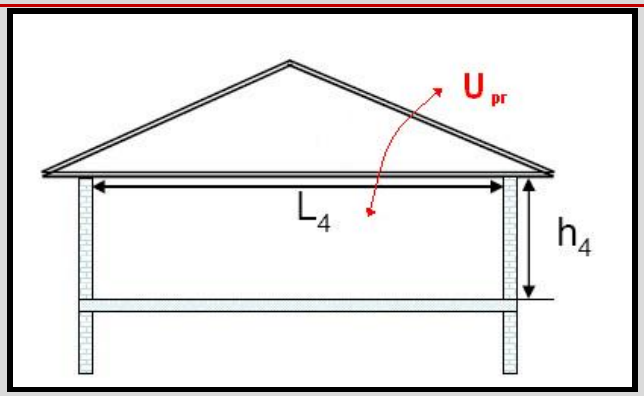
<table>
<tr><th colspan="2">Zone Height and Element Areas</th></tr>
<tr><td>

- For ground and intermediate floors the zone height is from top of floor slab to top of floor slab.
- For top floor the zone height is from top of floor slab to soffit/ underside of roof slab
- For the purpose of zone height and surrounding wall areas, suspended ceilings and raised floors are ignored.

</td><td> 
</td></tr>
<tr><td>

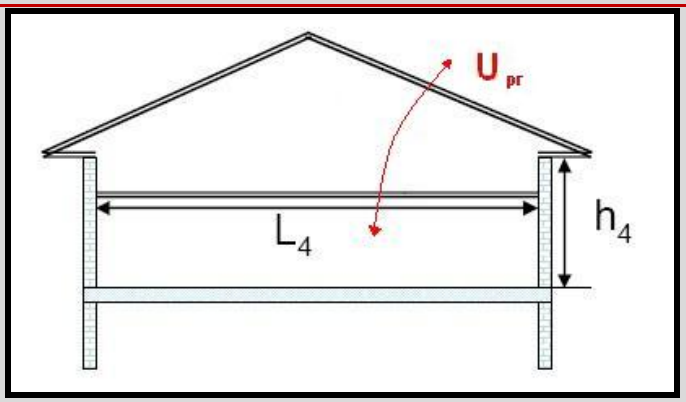
For top floors with pitched roof but flat ceiling:

- Zone height is top of floor to underside of soffit/eaves level - h4
- Area of gable wall is that below soffit/eaves level i.e. L4 x h4
- U value of Pitched Roof (U_{pr}) is from underside of ceiling to outside roof including insulation irrespective of its location in the roof.

</td><td> 
</td></tr>
<tr><td>

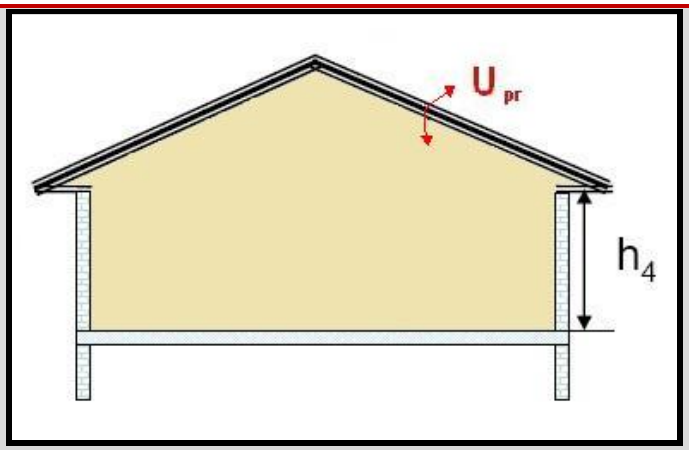
For top floors with pitched roof and dropped ceiling (with or without insulation at ceiling level):

- Zone height is top of floor to underside of soffit/eaves level - h4
- Area of gable wall is that below soffit/eaves level i.e. L4 x h4
- U value of Pitched Roof (U_{pr}) is from underside of ceiling to outside roof including insulation irrespective of its location in the roof.

</td><td> 
</td></tr>
</table>

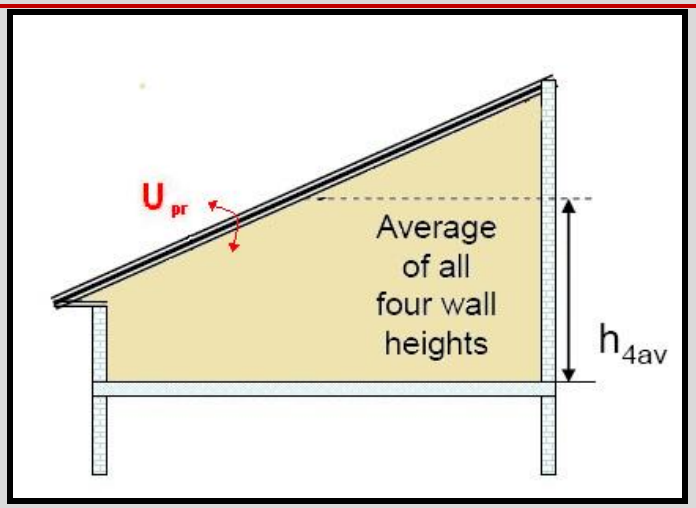
For top floors with pitched ceiling:

- Zone height is top of floor to underside of soffit/eaves level - h4 (not average room height)
- Area of gable wall is whole wall up to roof apex (shaded area)
- U value of Pitched Roof (U_{pr}) is from underside of ceiling to outside roof.



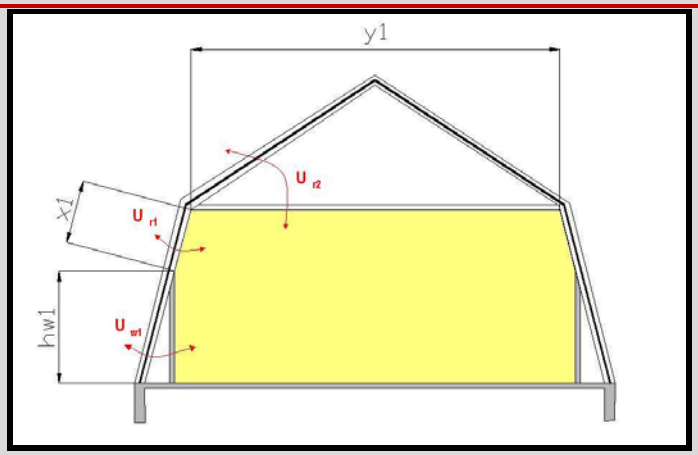
For top floors with mono-pitched ceiling:

- Zone height is top of floor to weighted average height of all walls - h4av
- Area of gable wall is whole wall (shaded area)
- Note that zoning for daylit areas must be carried out manually in these circumstances.
- U value of Pitched Roof (U_{pr}) is from underside of ceiling to outside roof.



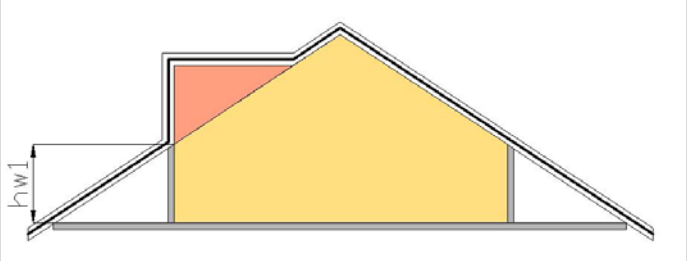
For Room in Roof or Mansard Roof:

- Zone height (hw1) = height of vertical part of wall.
  If hw1 varies around the zone, calculate the area weighted average height.
- The U-value (Uw1) through the external walls should include any voids as appropriate.
- The U-value (Ur1) through the first roof construction X1 is roof structure only.
- The U-value (Ur2) through the second roof construction Y1 is from underside of ceiling to outside roof including insulation as appropriate and void.



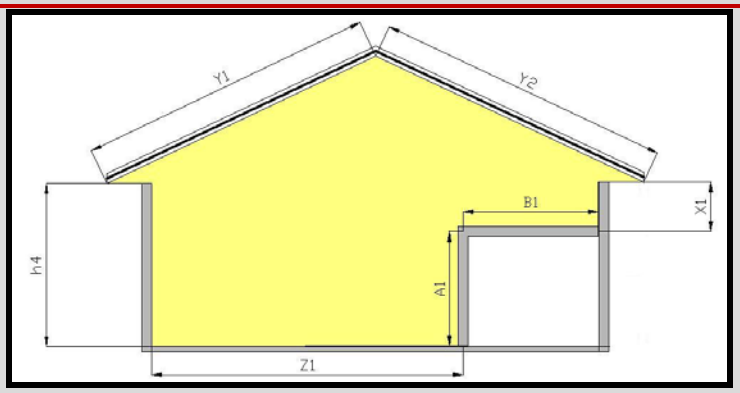
For Room in Roof with Dormer Window

- As per Room in Roof above.
- Zone height (hw1) = height of vertical part of wall.
  If hw1 varies around the zone, calculate the area weighted average height.
- Do not adjust zone height for dormer window
- The external elements, wall, roof and glazing of the dormer window should be included as normal.
- Zone manually for daylight areas (if glazing >20% of vertical wall area)



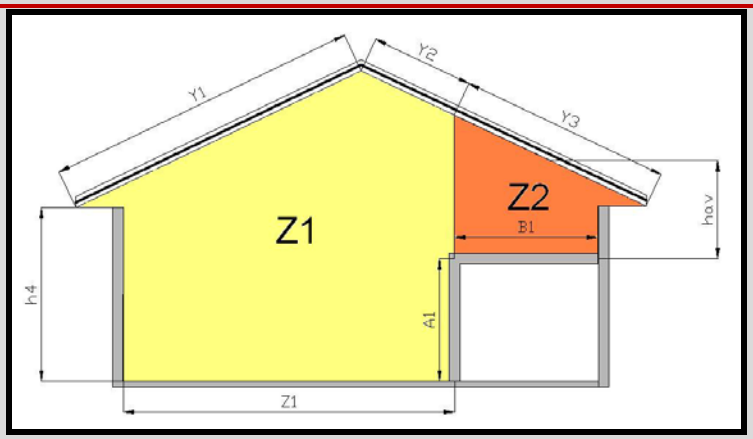
For Warehouse with unusable space above adjoining zone:

- Zone height is top of floor to underside of soffit/eaves level - h4
- Area of gable wall is whole wall up to roof apex (shaded area)
- Area of roof is (Y1 + Y2) x length of the zone
- Height of side walls shown as X 1 and h4
- Area of ground floor and area of zone is Z1 x length of the zone
- The internal elements shown as A1 and B1 should be added as appropriate.



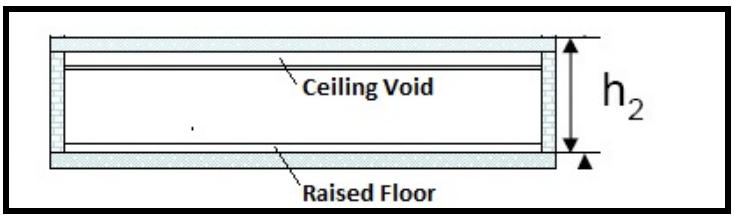
For Warehouse with usable space above adjoining zone, the warehouse is split into two zones:

- Zone height for Z1 is top of floor to underside of soffit/eaves level - h4
- Zone height for Z2 is weighted average height of all walls - hav as per the monopitched ceiling guidelines.
- Area of gable wall for Z1 is whole wall up to roof apex (shaded area in yellow)
- Area of gable wall for Z2 is whole wall up to roof apex (shaded area in orange)
- Area of roof in Z1 is (Y1 + Y2) x length of the zone
- Area of roof in Z2 is (Y3) x length of the zone



Slab Thickness
When there is insufficient proof of the actual slab thickness (not detailed in drawings for example), a default of 250mm is used.

Ensure that where ceiling voids and raised floors exist that these are correctly identified. The depth of the ceiling voids and raised floors is included in the overall height of the zone. Check that documentary evidence is maintained to support entry.



Global Zone Height
A global zone height can be set in iSBEM under General and Geometry -> Building Details. The value entered is given as the global or default zone height in each of the zones. The zone height can be altered, or use the global height for respective zones. Where a zone height differs from the global/default height, select the global button  and enter the actual zone height.

Appendix 7: Identifying the Heating System

A7.1 Building Heating System Flow Chart

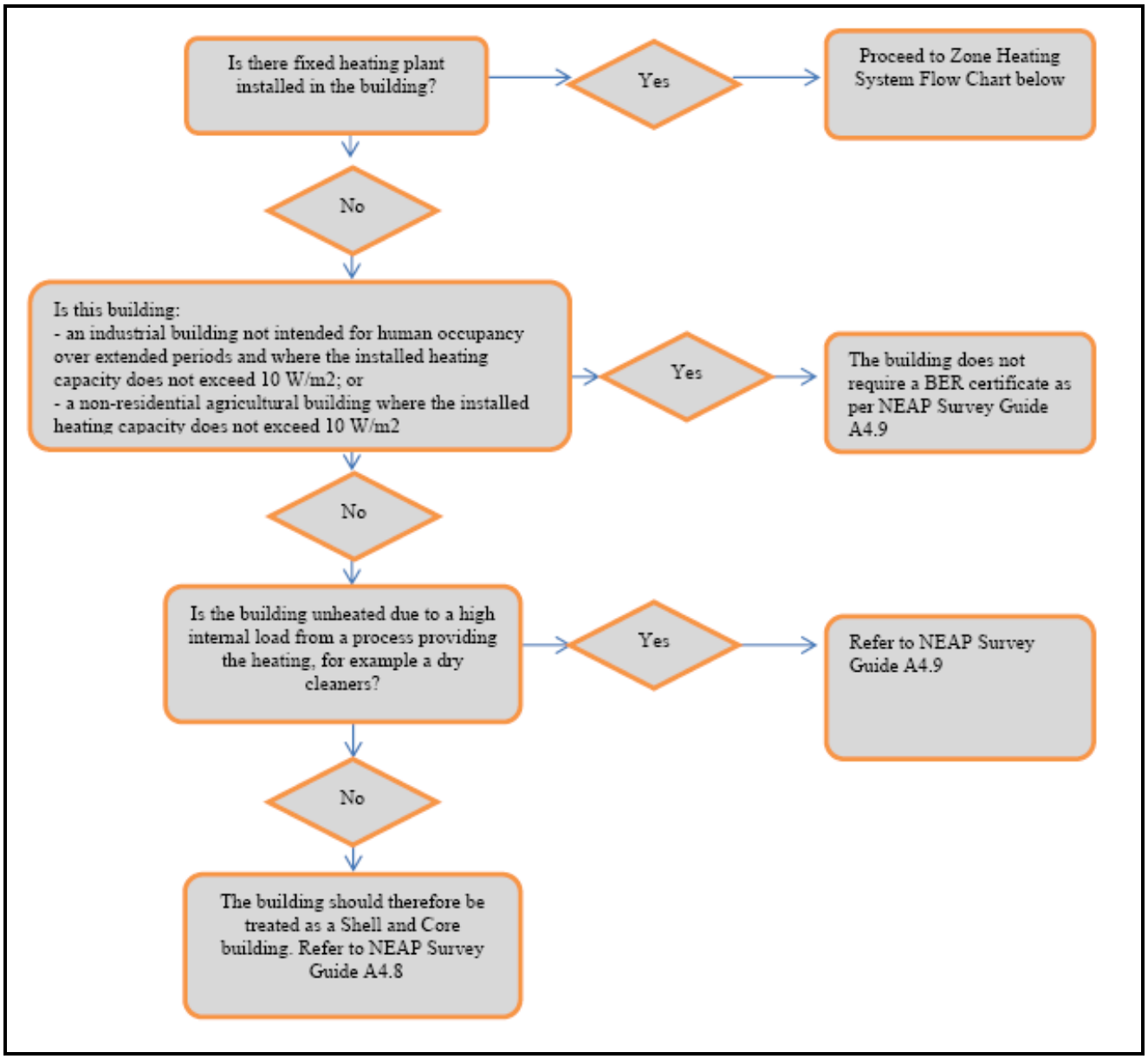


Table A7.1 Examples of Unheated Buildings

The following outlines examples of unheated buildings:

Unheated Parameters	**Some Building Types to which the parameters may apply**
Is this building: - an industrial building not intended for human occupancy over extended periods and where the installed heating capacity does not exceed 10 W/m^2; or - a non-residential agricultural building where the installed heating capacity does not exceed 10 W/m^2	• Warehouse and Storage
Is the building unheated due to a high internal load from a process providing the heating, for example a dry cleaners?	• Industrial Process Building • Laundry • Retail (Fast food outlet)
Shell and Core Building	• Office • Retail • Industrial Process Building

A7.2 Zone Heating System Selection Flow Chart

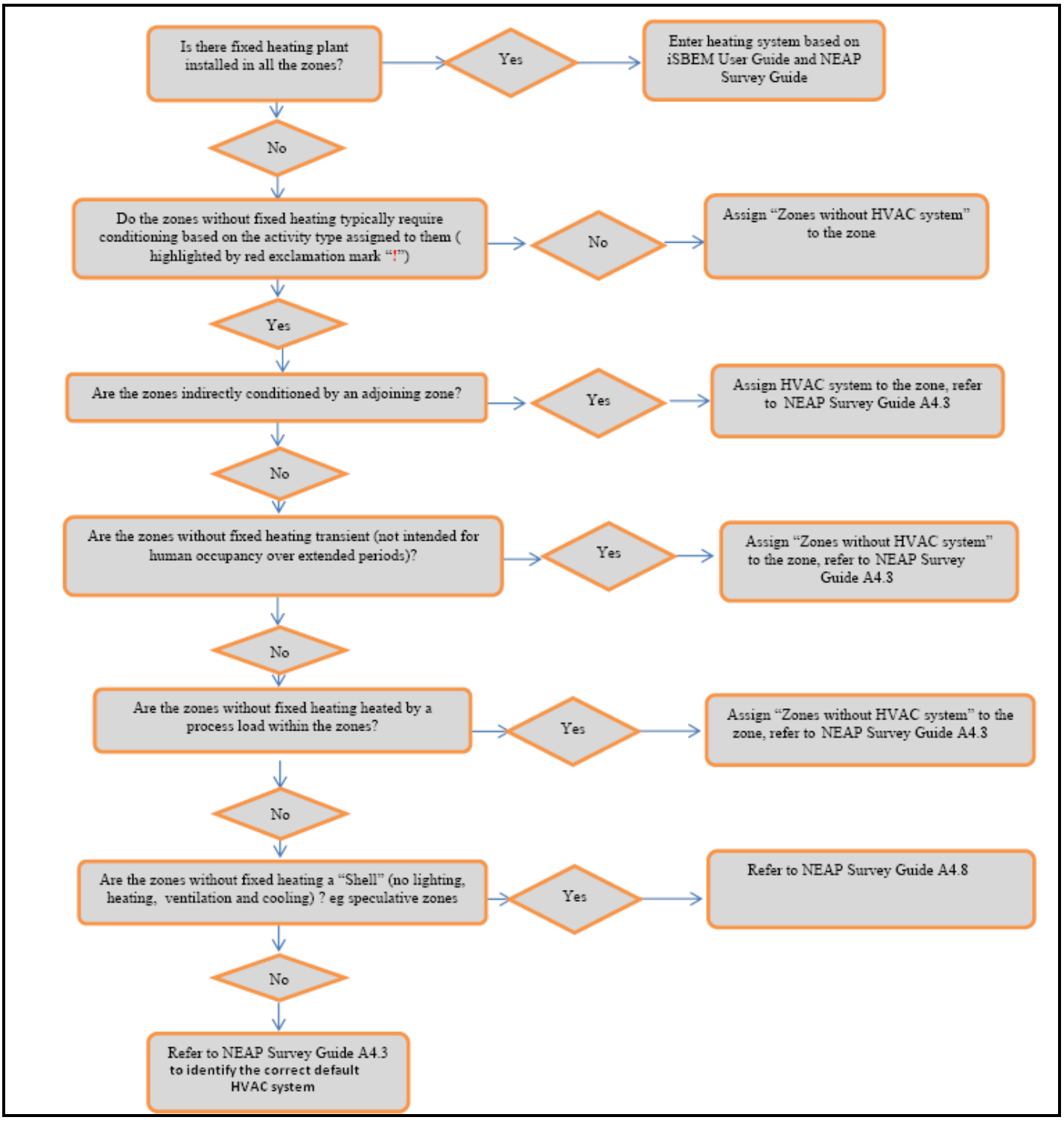


Table A7.2 Examples of Unheated Zones

The following outlines examples of unheated zones:

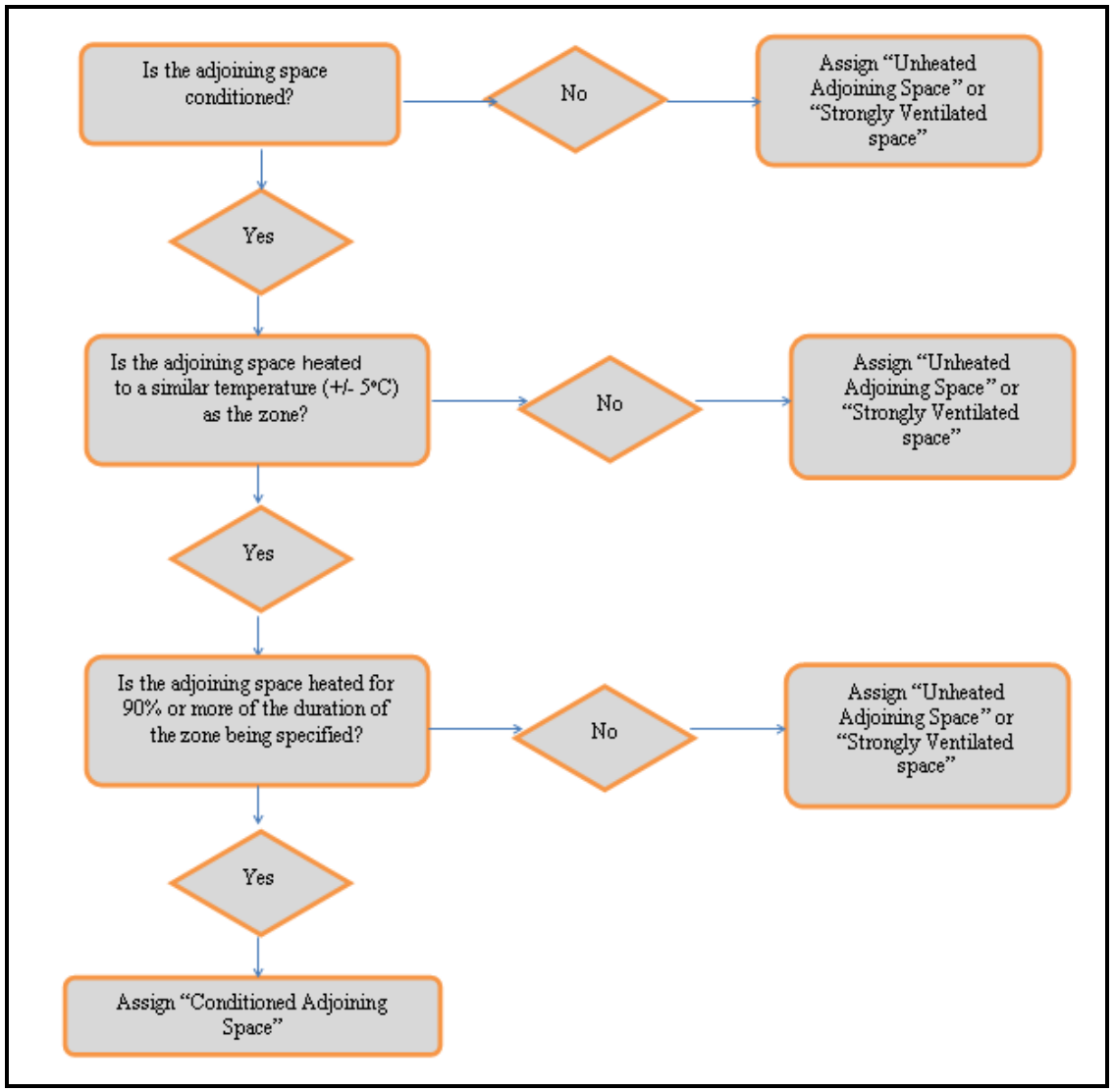
Unheated Parameters	Some Unheated Zone Types to which the parameters may apply
The zone does not have fixed heating and typically does **not** require conditioning based on the activity type (no red exclamation mark "!" shown in iSBEM) "Zones without HVAC system" is assigned to the zone.	• Storage Area • Circulation Areas • Storage – chilled • Plantroom • Warehouse Storage
The zone does not contain fixed heating and is indirectly conditioned by an adjoining zone open to the zone. HVAC system of the adjoining heated zone is assigned to the zone. See Survey Guide Section A4.3 and iSBEM user guide section 7.6.8	• Circulation Areas (open to conditioned spaces)
The zone does not contain fixed heating and is a transient space (not intended for human occupancy over extended periods)? "Zones without HVAC system" is assigned to the zone. See Survey Guide Section A4.3.	• Toilet • Tea Making • Changing Facilities • Bathroom
The zone does not contain fixed heating and is heated by a process load within the zone? "Zones without HVAC system" is assigned to the zone. See Survey Guide Section A4.3.	• Industrial process area • IT Equipment • Data Centre • Laundry • Food Preparation
The zone does not have fixed heating and is a "Shell" (no lighting, heating, ventilation and cooling) ? eg speculative zones HVAC system assigned to the zone as per NEAP Survey Guide A4.8	• Speculative Office • Speculative Retail • Speculative Industrial
The zone does not have fixed heating, typically requires conditioning based on the activity type (red exclamation mark "!" shown in iSBEM) and does not meet conditions above. Default HVAC system assigned to the zone as per NEAP Survey Guide A4.3	• Cellular Office • Open Plan Office • Meeting Room • Classroom • Hall / Lecture Theatre/ Assembly Area • Laboratory • Consulting Room • Bedroom

Where fixed space heating is present in the zone, the HVAC system is entered based on the iSBEM User Guide and NEAP Survey Guide.

Appendix 8: Adjoining Conditioned and Unconditioned Spaces

Heat losses through building elements, must be correctly accounted for in the BER assessment.

The building element within a zone must have the conditions in the adjoining space assigned to the element. The following flow chart gives details of when to assign alternate conditions:



Adjoining spaces, either within the building being assessed or the adjoining building are treated as follows in iSBEM:

a) "Conditioned Adjoining Space" if the space adjoining the element (zx/xx/xi) has the same activity as the zone (zx/xx) or is normally heated to similar levels as the zone (i.e. heated to a similar temperature (+/-5°C) for 90% or more of the duration of the zone being specified.)

b) "Unheated Adjoining Space" or "Strongly ventilated spaces" if the above condition is not met.

The heating regime of the adjoining space is determined as follows:

1) If there is access to details of the zones within the adjoining building, base the parameters for the element on the activity and installed HVAC system within that zone.

2) If there is no access to the zones in the adjoining building, base the parameter for the element on the building type using the following table of temperature profiles for common building types. These building types have been selected from the SBEM Activity Database for common building types typically adjoining a non domestic building. The table is based on the SBEM Activity Database for the main activities within each of the building types.

Building Type	**Weekly Temperature Profile**		**Annual Temperature Profile**
Airport Terminal	Mon to Sun:	12°C - 0 to 24	All Year
Transport Terminal	Mon to Sun:	12°C - 0 to 24	All Year
Community/Daycare Centre	Mon to Fri:	12°C - 0 to 7 22°C - 7 to 18 12°C - 18 to 24	All Year
	Sat to Sun:	12°C - 0 to 24	
Primary Health Care	Mon to Fri:	12°C - 0 to 6 22°C - 6 to 18 12°C - 18 to 24	All Year
	Sat to Sun:	12°C - 0 to 24	
Further Education University	Mon to Fri:	12°C - 0 to 7 20°C - 7 to 20 12°C - 20 to 24	Jan 1 to Jan 12: 12°C Jan 13 to Mar 20: Weekly Profile Mar 21 to Apr 3: 12°C Apr 4 to June 12: Weekly Profile June 13 to Sept 25: 12°C Sept 26 to Dec 11: Weekly Profile Dec 11 to Dec 31: 12°C
	Sat to Sun:	12°C - 0 to 24	
Restaurant/public house	Mon to Sun:	12°C - 0 to 6 23°C - 6 to 23 12°C - 23 to 24	All Year
Theatres/cinemas/music halls and auditoria	Mon to Sun:	12°C - 0 to 8 22°C - 8 to 22 12°C - 22 to 24	All Year
Office	Mon to Fri:	12°C - 0 to 6 22°C - 6 to 19 12°C - 19 to 24	All Year
	Sat to Sun:	12°C - 0 to 24	
Retail	Mon to Sat:	12°C - 0 to 7	All Year

	Sun:	20°C - 7 to 19 12°C - 19 to 24 12°C - 0 to 8 20°C - 8 to 17 12°C - 17 to 24	
Warehouse	Mon to Sun:	12°C - 0 to 24	All Year
Workshop/ Maintenance Depot	Mon to Sun:	12°C - 0 to 24	All Year

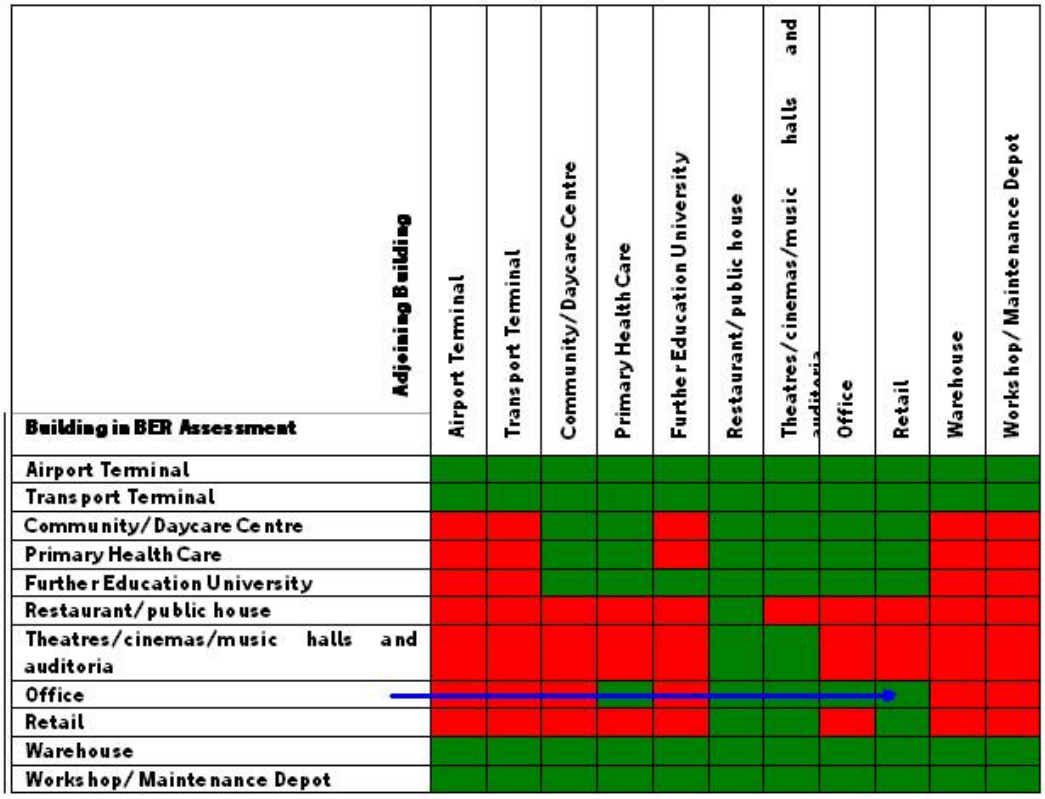
A simple matrix aligned to the table above shows when a building is adjoining another building whether it is considered conditioned or unconditioned / strongly ventilated.

Conditioned Adjoining Space

Unconditioned Adjoining Space/ Strongly Ventilated Space

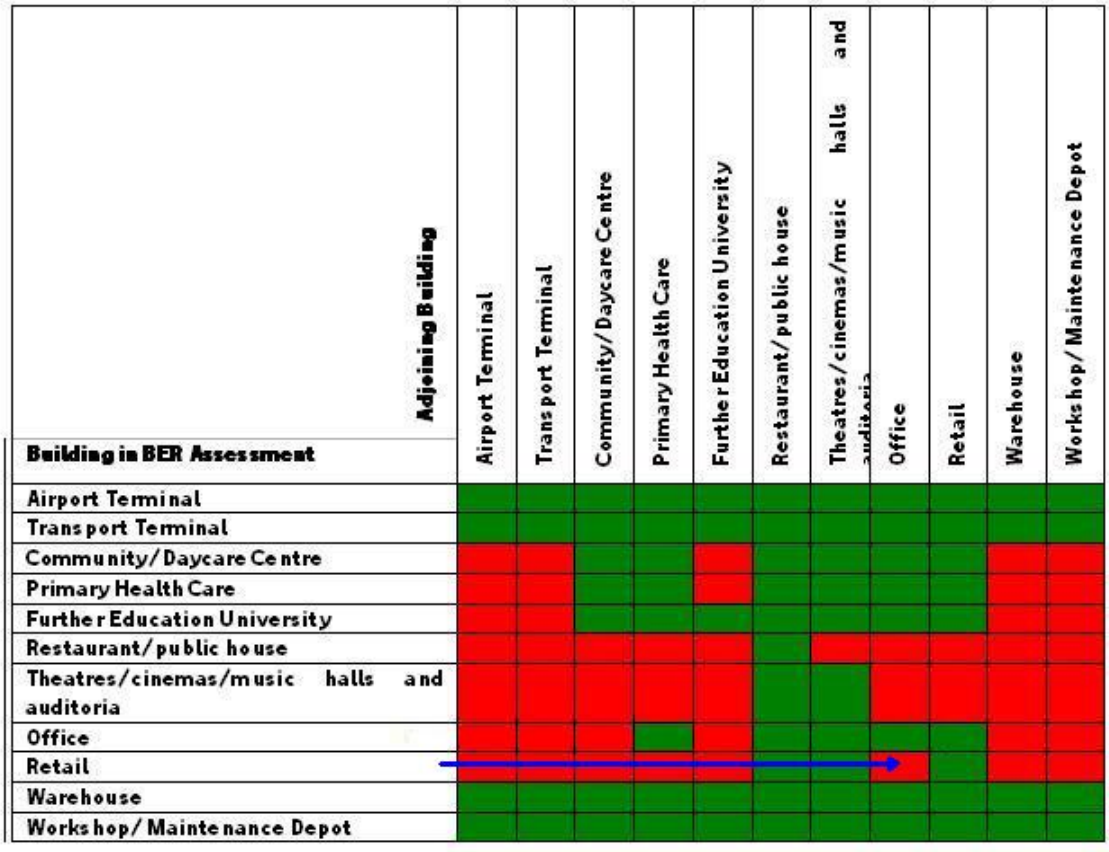
Building in BER Assessment / **Adjoining Building**	Airport Terminal	Transport Terminal	Community/Daycare Centre	Primary Health Care	Further Education University	Restaurant/public house	Theatres/cinemas/music halls and auditoria	Office	Retail	Warehouse	Workshop/ Maintenance Depot
Airport Terminal											
Transport Terminal											
Community/Daycare Centre											
Primary Health Care											
Further Education University											
Restaurant/public house											
Theatres/cinemas/music halls and auditoria											
Office											
Retail											
Warehouse											
Workshop/ Maintenance Depot											

Example:
If carrying out a BER assessment on an office with an adjoining retail building, base the adjoining condition from the table as being is a "Conditioned adjoining space". There is insufficient access to the retail building to identify the specific zones within. See below:



Building in BER Assessment \ Adjoining Building	Airport Terminal	Transport Terminal	Community/Daycare Centre	Primary Health Care	Further Education University	Restaurant/public house	Theatres/cinemas/music halls and auditoria	Office	Retail	Warehouse	Workshop/Maintenance Depot
Airport Terminal											
Transport Terminal											
Community/Daycare Centre											
Primary Health Care											
Further Education University											
Restaurant/public house											
Theatres/cinemas/music halls and auditoria											
Office											
Retail											
Warehouse											
Workshop/Maintenance Depot											

However if carrying out a BER assessment on a retail building with an adjoining office building: There is insufficient access to the office building to identify the specific zones within. Base the adjoining condition from the table as being an "Unheated adjoining space." See below



Building in BER Assessment \ Adjoining Building	Airport Terminal	Transport Terminal	Community/Daycare Centre	Primary Health Care	Further Education University	Restaurant/public house	Theatres/cinemas/music halls and auditoria	Office	Retail	Warehouse	Workshop/Maintenance Depot
Airport Terminal											
Transport Terminal											
Community/Daycare Centre											
Primary Health Care											
Further Education University											
Restaurant/public house											
Theatres/cinemas/music halls and auditoria											
Office											
Retail											
Warehouse											
Workshop/Maintenance Depot											

Where an element is adjoining an Unheated Adjoining Space or a Strongly Ventilated space, the U value of the element is adjusted to account for the effect of the unheated space. The procedure for calculating the U-value is described in the Non Domestic Building Regulations Part L Technical Guidance Document and in Appendix A of BR 443:2006. The method in BR 443 is derived using EN 13789.

For adjoining buildings it may not always be possible to determine the parameters required to calculate the Ru value. The following conservative guidelines may be used to derive these parameters where relevant information is not available on the adjoining building:

U-values of adjoining building's external elements:

1. If the assessed and adjoining buildings were constructed at the same time and are of similar construction, the U-values of the external elements of the adjoining building should be based on the same U-values as the building being assessed.
   The building being assessed may have been upgraded since original construction, however unless the BER Assessor can provide documentary evidence to support that the adjoining building was upgraded, the U-values of the external elements of the adjoining building are based on the original construction.
2. If the adjoining building was constructed at a different time to the building being assessed, base the U-values of the external elements of the adjoining building on default U-values for the building age using the inference method.
3. If neither of the above options apply or if in doubt, use a conservative default of 2 W/m2K for all external elements of the adjoining building. This is the default value used in the BRE U-value calculator.

Measurements:

1. Base the estimated measurements of the adjoining building on the information available during the site survey or other available information e.g. planning files etc. The measurements should be based on the most applicable conservative value with the Assessor commenting and keeping a record of the calculations.
2. Where access is restricted to the adjoining building, base the dimensions for the adjoining building on external dimensions.
3. If the external dimensions of the adjoining building are not accessible, estimate the size of the building as a proportion of the building being assessed. (for example it is twice the width of the building being assessed and half the height)
4. Where internal zones are not accessible in the adjoining building, the areas and volume should be based on the entire building.

Ventilation Rate:

The air change rate within the Unheated Space is as per Table A5 of BR 443. The default air change rate is 3, to be used if the airtightness type of the unheated space is not known.

SEAI have developed an FAQ and calculation tool to assist assessors correcting the U-value adjacent to unheated spaces within a zone. Please refer to www.seai.ie/berfaq .

Appendix 9: Determining the Hot Water Storage Volume

Where there is access to the hot water storage unit, determine the storage volume as follows:

a. Determine the hot water storage volume from a label on the storage unit, provided the label also references a European or National Standard or is CE marked.
b. Take note of the Manufacturer and Model of the unit and determine the volume from literature from the manufacturer referencing the relevant standards.
c. Take note of the Manufacturer and Model of the unit and contact the manufacturer regarding the storage volume. The manufacturer must provide written confirmation of the storage volume.
d. Where data from the above sources is unavailable and the vessel is accessible, measure the volume of the unit on site. Further detail on this is provided below.
e. Where the hot water storage vessel is inaccessible, documentary evidence from the installer, architect or engineer identifying the volume of the installed vessel is used.
f. If none of these options are possible base it on the SBEM default.

Measuring a Hot Water Storage Cylinder:

1) Measure the height and diameter of the hot water storage vessel.

2) For cylindrical vessels that are between 71 and 441 litres, choose the nearest height and diameter options from the table below to determine the volume in litres. Insulation thickness is not included in the height or diameter measurement when using the table. The table below is based on BS1566 and applies to copper cylinders, however, these figures are also used for other types of storage vessels for the purposes of NEAP assessments.

   The storage vessel diameter is determined based on vessel circumference, dividing the circumference by π (3.14). Diameter should not include insulation thickness.

Diameter (mm)	Height (mm)	Storage volume
300	1600	96
350	900	72
400	900	96
400	1050	114
450	675	84
450	750	95
450	825	106
450	900	117
450	1050	140
450	1200	162
450	1500	206
500	1200	190
500	1500	245
600	1200	280
600	1500	360
600	1800	440

3) For cylindrical vessels outside this range, the volume is calculated based on the following:

   $V = (pi \times r^2) \times h / 1000$

Where: r = radius of the unit (cm)
h = height of the unit (cm)
pi = 3.142
V = volume of unit (litres)

For Enclosed Water Heaters:

The water heater volume is calculated by recording the height, width and depth of the water heater if the heater is cuboid or the above formula if cylindrical. The cuboid volume is then calculated as follows:

V = h x d x w x 1000

Where: d = depth of unit (m) minus the insulation thickness as appropriate.
h = height of unit (m) minus the insulation thickness as appropriate.
w = width of unit (m) minus the insulation thickness as appropriate
V = volume of the cylinder (litres)

For example

The diagram below shows a water heater with measured dimensions on site for a unit installed in 2005. The default insulation thickness is therefore 35mm.

The volume of the storage unit is therefore:

V = h x d x w x 1000

h = 550 – (35 x 2) = 480mm
d = 330 – (35 x 2) = 260mm
w = 330 – (35 x 2) = 260mm

Volume = 0.48 x 0.26 x 0.26 x 1000 = 32 litres

Appendix 10: Selection of Solid Fuel Type.

Solid fuel appliances can be fuelled by coal, anthracite, smokeless fuel, dual fuel (mineral and wood) and biomass.

For solid fuel boilers and heaters the fuel type is chosen as follows, proceeding from points 1 towards 4 until a choice is made:

1) If the heating appliance is designed to burn only biomass, i.e. its design is such as to prohibit the use of any other fuel type, then the appropriate fuel type (biomass) should be selected. Otherwise biomass should not be selected. This can be demonstrated by one of the following:
    i. Documentation showing that the product warranty is void if the product is used with any fuel type other than biomass ;
    ii. Listing of the product under http://www.hetas.co.uk/ showing that the appliance burns biomass only.

   Where there is any doubt about fuel type selection biomass should not be selected.
2) If the appliance is designed to burn a particular coal-based or peat-based fuel type, then that should be chosen as the fuel.
3) If the appliance can burn more than one fuel type, the most likely non-biomass type should be selected based on (a) the appliance design, and (b) the building location (taking account of smoke control areas and fuels common in the area).

The following table summarises the information above:

Scenario	**Biomass**	**Manufactured smokeless fuel**	**One of coal or anthracite**
Appliance can only burn biomass	Yes	No	No
Appliance can burn multiple solid fuels but a particular fuel is the most commonly available or applicable non-biomass fuel in the area	No	Yes - Select manufactured smokeless fuel when building is in "smoke control area" and the appliance can burn multiple fuels	Yes - Select one of these fuels when building is in non "smoke control area" and that fuel is clearly the most commonly available fuel in the area

Smoke control areas (also called coal restricted areas) can be identified using the facility under http://maps.epa.ie or following guidance on the Department of Environment, Community and Local Government website. Individual Local Authorities may have further details.

Appendix 11: Identifying Common Lighting Systems

The following are examples of various lighting systems:

	**Tungsten Lamps**
	**Compact Fluorescents**
	**Tubular Fluorescents** T5: 16mm diameter T8: 26mm diameter T12: 38mm diameter
	**Metal Halide**

The SEAI website provides a number of lighting guides. These are useful in identifying different lighting systems: http://www.seai.ie/Your_Business/Technology/Buildings/Lighting.html.