Explanation of the general relationship between various CEN standards and the Energy Performance of Buildings Directive (EPBD) ("Umbrella document")

Version 3a, 25 October 2004

This document provides an outline of the calculation procedure for assessing the energy performance of buildings. It includes a list of the European standards, both existing and those that are being written, which together form the calculation methodology. Drafts of the new standards are being prepared during 2004.

The document will be updated as the drafting work proceeds.

Contents

1 Introduction

Directive 2002/91/EC on the energy performance of buildings (the EPBD) requires several different measures to achieve prudent and rational use of energy resources and to reduce the environmental impact of the energy use for buildings.

This is to be accomplished by increased energy efficiency in both new and existing buildings. One tool for this will be the application by Member States of minimum requirements on the energy performance of new buildings and for large existing buildings that are subject to major renovation (EPBD Articles 4, 5 and 6). Other tools will be energy certification of buildings (Article 7) and inspection of boilers and air-conditioning systems (Articles 8 and 9).

A basic requirement for measures in Articles 4, 5, 6 and 7 is the existence of a general framework for a methodology of calculation of the total energy performance of buildings, as set out in Article 3 and the Annex to the Directive.

This paper describes the European standards (ENs) that are intended to support the EPBD by providing the calculation methods and associated material to obtain the overall energy performance of a building. While many of these standards have already been published, there are several others which currently are at various stages of the drafting process, together with a number of new items on which work started in 2004.

In Appendix 1 the standards concerned are arranged in a hierarchical fashion. Section 1 contains standards that interact directly with the articles of the Directive, while the remainder deal with aspects of the calculation leading up to the overall energy use.

2 Relationship of the standards to the EPBD

2.1 Introduction

The various standards needed to build up the overall energy use are listed in Appendix 1 to this paper. The calculation methodology follows the framework set out in the Annex to the EPBD. Many of the standards deal with specific aspects of the calculation (eg fabric losses, air changes, lighting needs, system performance): these aspects are drawn together in the following items:

Item	Content
14 (EN ISO 13790 extended)	Net energy use for heating and cooling (taking account of losses and gains)
4	Delivered energy use, for heating, cooling, ventilation systems, hot water and lighting, inclusive of system losses and auxiliary energy, and definition of energy ratings
2	Primary energy and CO_2 emissions
1+3	Ways of expressing energy performance (for the energy certificate) and ways of expressing requirements (for regulations)
1+3	Content and format of energy performance certificate
5	Boiler inspections
6	Air-conditioning inspections

The main goal of these standards is to facilitate Member States in the implementation of the Directive. In consequence they do not prescribe the definitions of energy ratings or the expression of energy performance, but rather give a limited number of options. Similarly the items on inspections offer various levels of inspection.

The three main components for implementation of the Directive are:

- calculation methodology

- energy certificate

- inspections of boilers and air-conditioning

Figure 1 illustrates how the standards are related to articles of the EPBD defining these requirements.

2.2 Calculation methodology

The standards providing the calculation methodology are indicated in Figure 1.

The calculation methodology is used to determine the data for energy certificate. WI 14 allows for different levels of complexity,

- Simplified hourly calculation;
- Simplified monthly calculation;
- Detailed calculations;

which can be chosen according to relevant criteria such as type and/or complexity of the building and its services. The calculations are based on specified boundary conditions of indoor climate (WI 31) and external climate. The detailed calculation method is not specified, but an implementation must be validated according to the criteria in WI 17.

2.3 Energy performance certificate

The indicative content of the energy performance certificate is set out in WI 1/3.

WI 4 provides ratings to define energy performance. The principal categories are:

- asset rating, based on calculated energy use under standardised occupancy conditions;

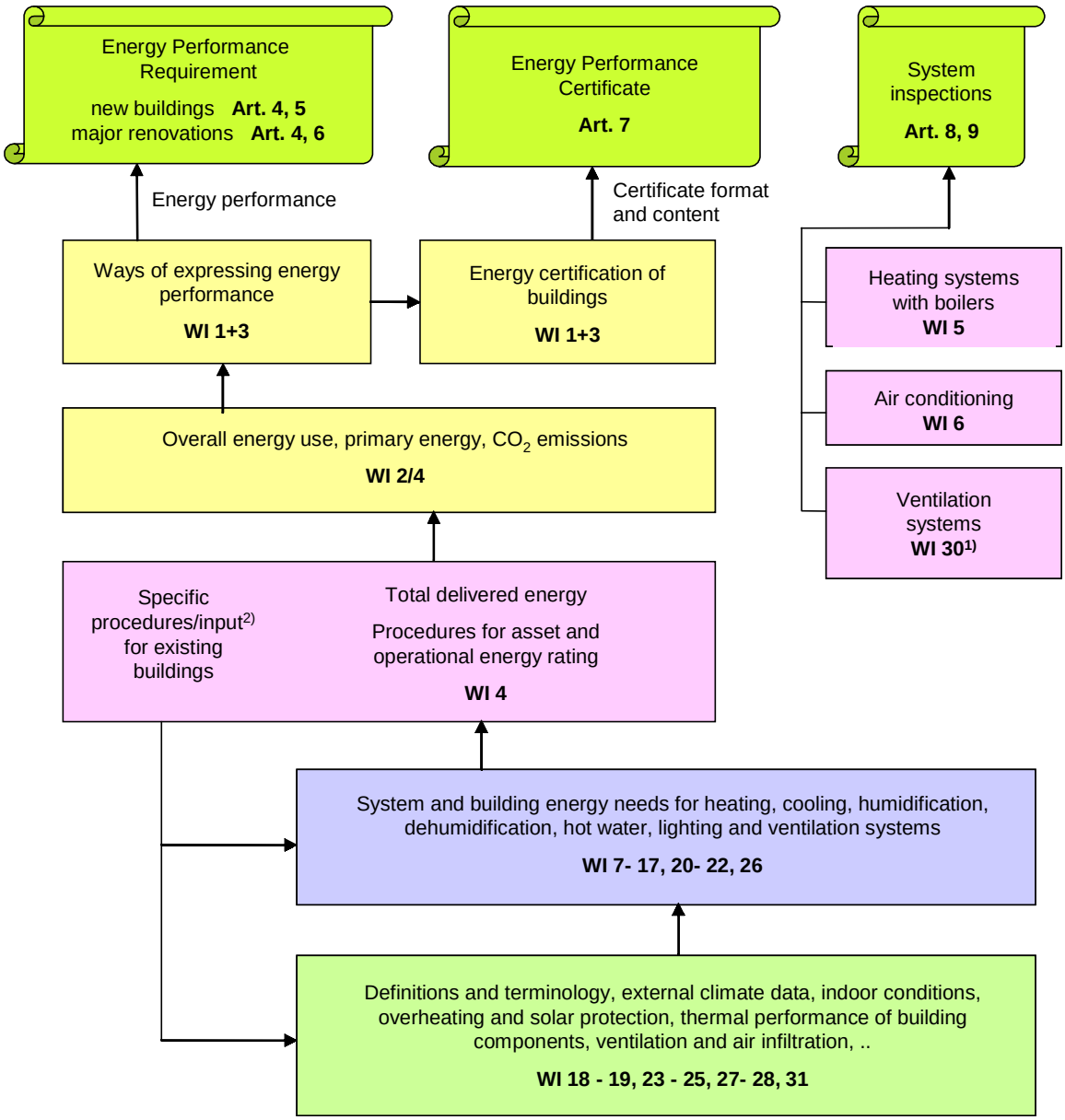
- operational rating, based on metered energy.

2.4 Periodic inspections of boilers and air-conditioning

These items provide guidelines for the inspection of boilers and heating systems (WI 5) and of air-conditioning systems (WI 6). These standards provide for different levels of inspection.

Figure 1

Methodology for calculating energy performance (Article 3 and Annex)



1): Not explicitly mentioned in the Directive

2): Unless already covered by WI 7-28

3 CEN Committees

The Technical Committees of CEN that are involved in the preparation of the standards comprise:

- CEN/TC 89 Thermal performance of buildings and building components
- CEN/TC 156 Ventilation for buildings
- CEN/TC 169 Light and lighting
- CEN/TC 228 Heating systems in buildings
- CEN/TC 247 Building automation, controls and building management

The process is being overseen by CEN/BT WG 173, Energy performance of buildings project group, to coordinate the work and to ensure that standards prepared in different committees interface with each other in a suitable way.

4 Definitions

This section will contain definitions from the standards that are relevant to this document. Below is a preliminary list

energy performance of a building
amount of energy actually consumed or estimated to meet the different needs associated with a standardised used of the building, which may include, *inter alia,* heating, hot water heating, cooling, ventilation and lighting

asset rating
rating based on calculations and standardised use of the building or the activity areas concerned. It represents the intrinsic potential of the building under standardised conditions of weather and internal environment

operational rating
rating based on measured energy use. It is a measure of the in-use performance of the building. This is particularly relevant to certification of actual performance

energy sources
all sources from which useful energy can be recovered directly or by means of a conversion or transformation process (e.g. solid fuels, liquid fuels, solar energy, biomass, etc.)

energy carrier
substance or phenomenon that can be used to produce mechanical work or heat or to operate chemical or physical processes. (ISO 13600)

energyware
tradable commodity used mainly to produce mechanical work or heat, or to operate chemical or physical processes, and listed in annex A of ISO 13600.

NOTE Energywares form a proper subset of energy carriers. The set of energy carriers is open.

energyware consumption system
technical energy system consuming energyware and in many cases also other energy carriers and producing products and services. The buildings are such systems. (ISO 13600)

renewable energy
energy from sources that will not be exhausted during the lifetime of mankind, such as solar energy (thermal and photovoltaic), wind, hydraulic, biomass. The renewable energy used and produced by the building shall be counted separately.

primary energy
energy that has not been subjected to any conversion or transformation process. For a building, it is the energy used to produce the energy delivered to the building. It is the delivered energy divided by the conversion or transformation factor of each form of energy.

delivered energy
energy supplied to the building from the last market agent. The boundaries of the building are those defined for calculating its energy balance. The energy produced by the building itself, for example using solar water heater, photovoltaic systems or co-generation and delivered back to the market is subtracted. It is a net sum of energywares.

total energy use of the building
total energy delivered to the energy systems for heating, cooling, ventilation, hot water preparation, lighting, appliances etc. The total energy use is the sum of the delivered energy and the energy produced and used on site, including renewable forms, but excluding passive gains, collected per energyware. Energy delivered back to the market is not included.

net energy
the energy to be supplied by the energy systems to provide the required services, such as maintaining the building at the specified internal temperature, lighting or ventilating a space, etc, taking account of useful gains.

auxiliary energy
energy used by heating, cooling, domestic water, lighting and ventilation systems to transform the delivered energy into the useful energy. This includes energy for fans, pumps, pilot flames, electronics, etc., but not the energy that is transformed.

total floor area
floor area measured inside the outer walls excluding non-habitable cellars and unheated spaces, including the floor area on all storeys if more than one.

total exposed envelope area
total of the area of all external elements of the building that are exposed to the external environment or are exposed to the ground.

5 Overview of the calculation process

The calculation is based on the characteristics of the building and its installed equipment, as listed in the Annex to the EPBD. It is structured in three levels:

- calculation of the building net energy (energy needs for heating and cooling), together with that for ventilation, hot water and lighting;
- calculation of the building delivered energy;
- calculation of the overall energy performance indicators (primary energy, CO_2 emissions, etc.).

The calculation sequence is:

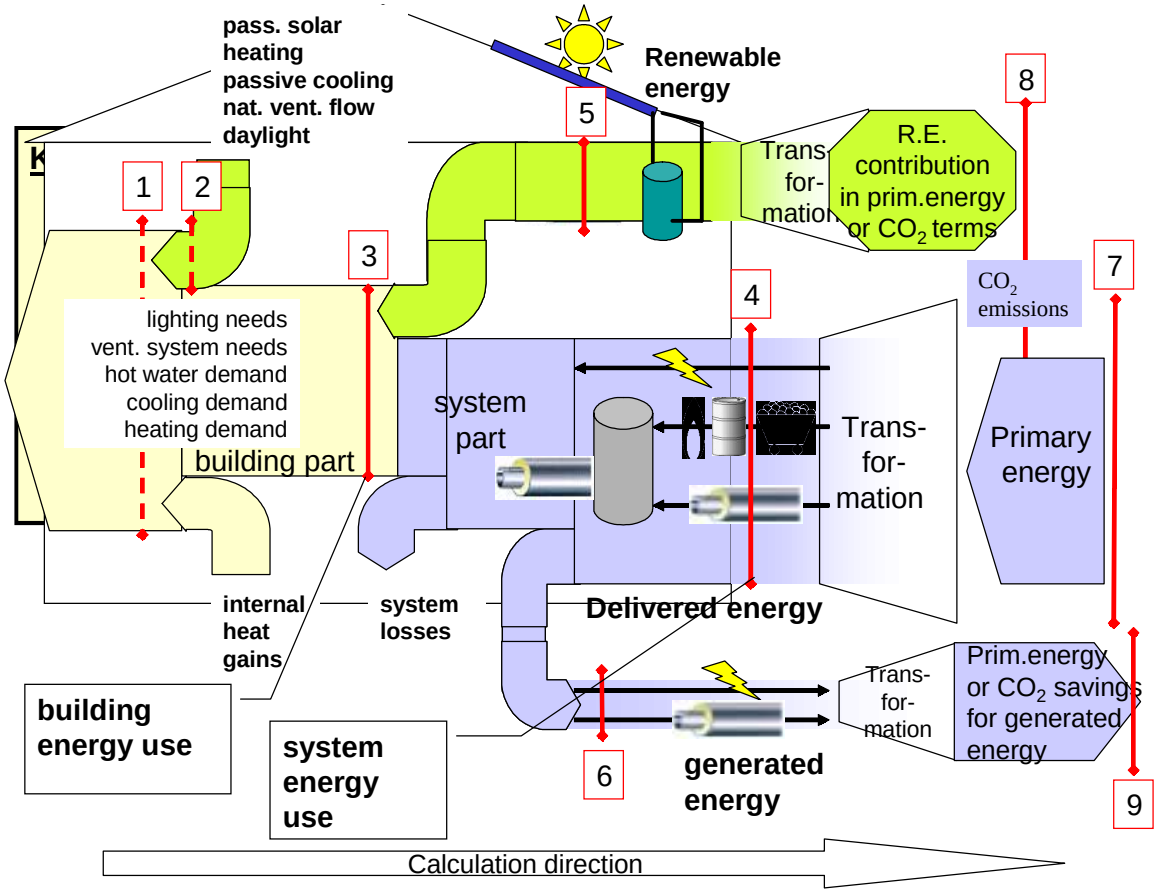
1) Calculate the building net energy, using applicable standards in Section 3 of Appendix 1. This part of the calculation considers only the building properties and not those of the heating/cooling system and results in the net energy use (energy to be given out by heat emitters, or to be extracted from the conditioned space, in order to maintain the specified internal temperature). The existing standard EN ISO 13790 covers the calculation of the heating requirement, and the methodology is being extended in WI 14 to include also cooling. To perform this calculation, data for indoor climate requirements, internal gains, building properties and outdoor climatic conditions are needed, and these are obtained using the standards in Section 4 of Appendix 1.
2) Take account of the characteristics of the heating, cooling, domestic hot water and lighting systems, inclusive of controls and building automation, to calculate the delivered energy, using standards in Section 2. Energy used for different purposes and by different fuels is recorded

separately. The calculations take account of heat emission, distribution, storage and generation, and include the auxiliary energy needed for fans, pumps etc.

3) Combine the results from 2) for different purposes and from different fuels to obtain the overall energy use and associated performance indicators, using standards in Section 1.

Figure 2 illustrates the overall scheme and Figure 3 shows how the energy flows are linked:

Figure 2



In Figure 2:

[1] is the gross energy needs – user's requirements for heating, lighting, cooling etc, which are specified for the purposes of the calculation.

[2] is the "natural" energy gains – passive solar, ventilation cooling, daylighting, etc

[3] the building's net energy use is obtained from [1] and [2] along with the characteristics of the building itself.

[4] is the delivered energy, represented separately for each energy carrier, inclusive of auxiliary energy, used by heating, cooling, ventilation, hot water and lighting systems, taking into account renewable energy sources and co-generation. This may be expressed in energy units or in units of the energyware (kg, m³, kWh, etc).

[5] is renewable energy produces on the building premises.

[6] is generated energy – produced on the premises and exported to the market; this can include part of [5].

[7] represents the primary energy usage or the CO_2 emissions associated with the building.

[8] represents the primary energy or emissions associated with on-site generation that is used on-site and so is not subtracted from [7].

[9] represents the primary energy or CO_2 saving associated with exported energy, which is subtracted from [7].

The overall calculation process involves following the energy flows from the left to the right of Figure 2.

Figure 3

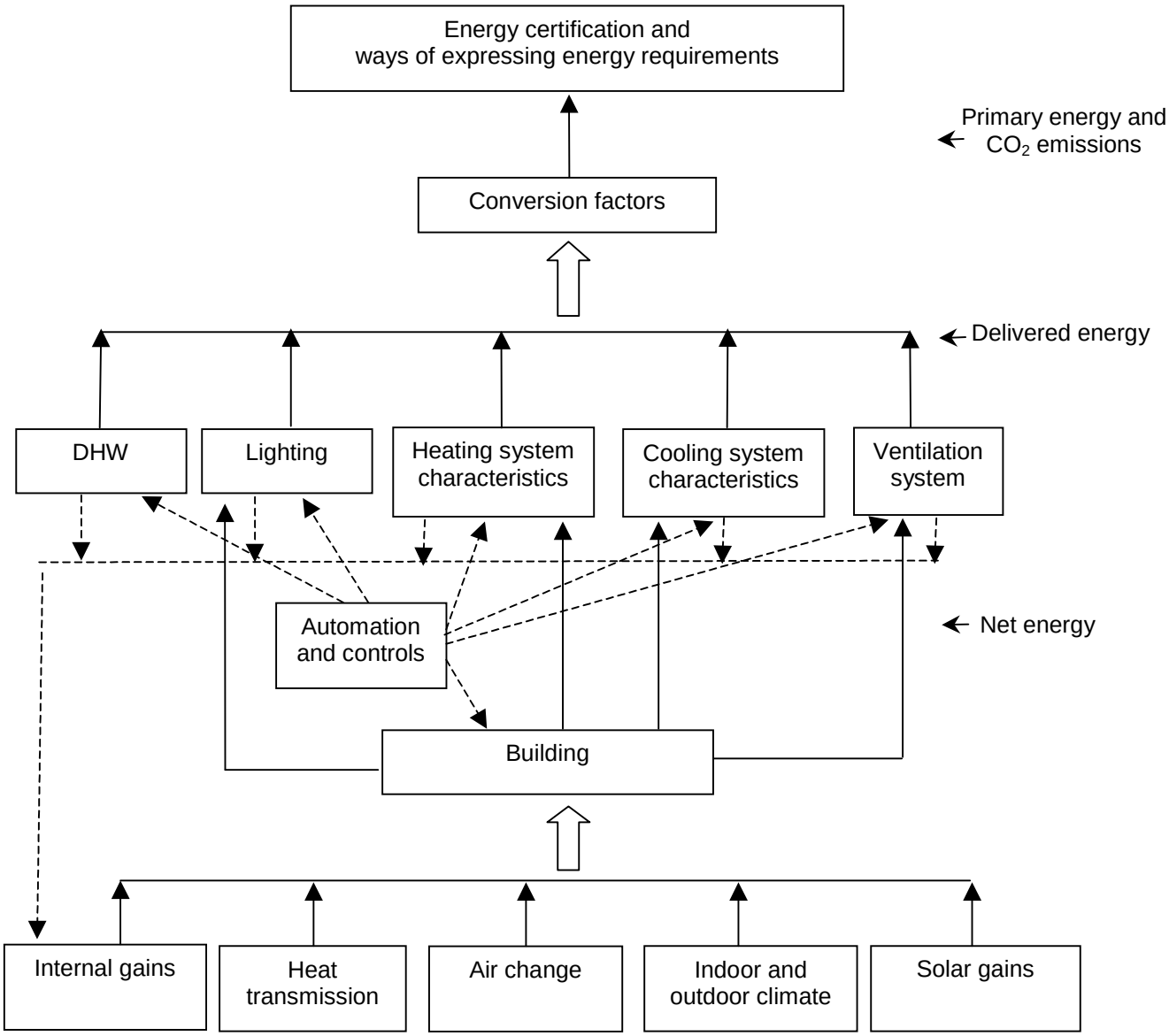
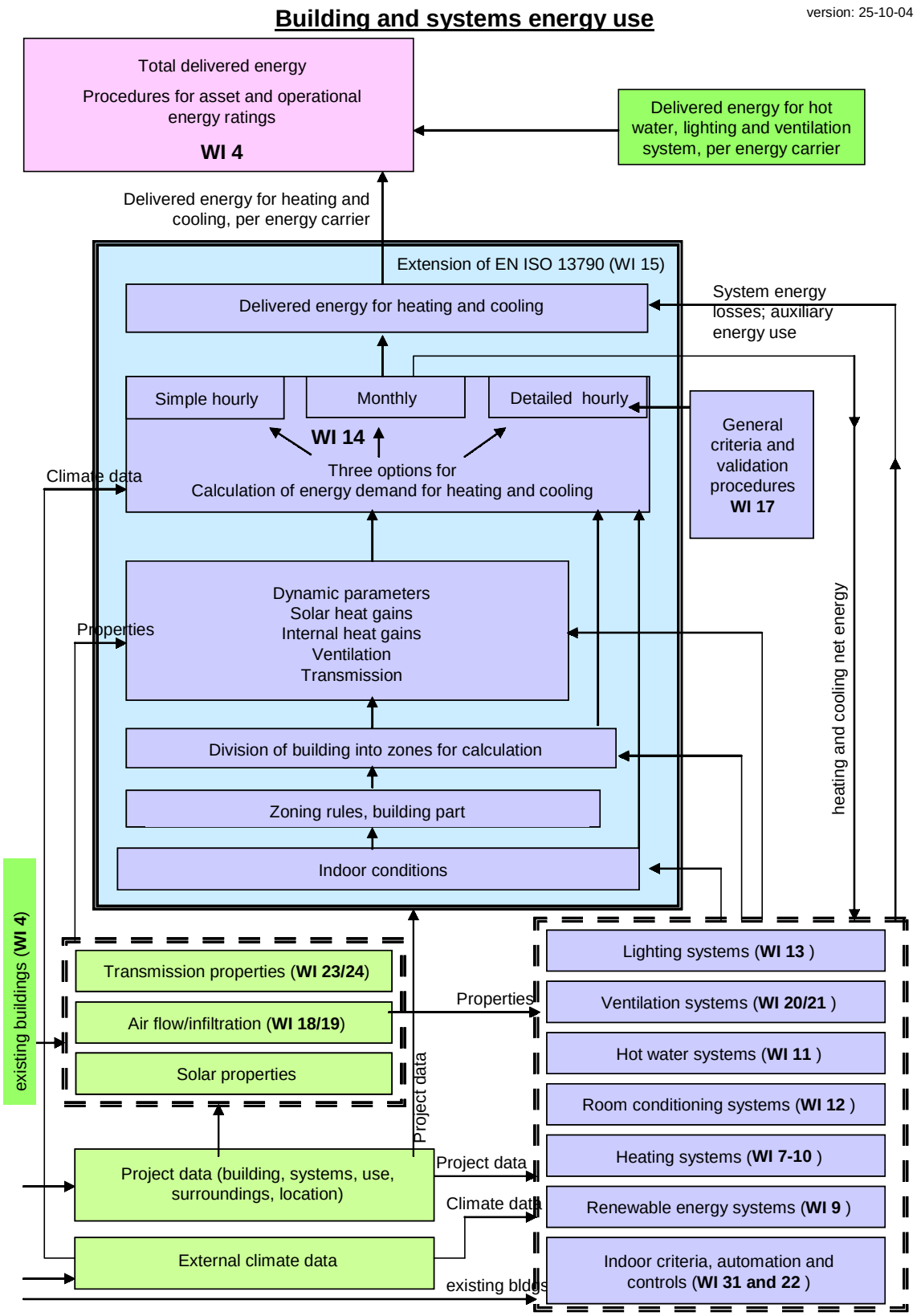

Energy certification and ways of expressing energy requirements
Primary energy and CO_2 emissions
Conversion factors
Delivered energy
DHW
Lighting
Heating system characteristics
Cooling system characteristics
Ventilation system
Automation and controls
Net energy
Building
Internal gains
Heat transmission
Air change
Indoor and outdoor climate
Solar gains

Figure 4: Outline of more detailed linkage diagram for the building part:



6 Outline of the standards

This describes the role of the standards as set out in Appendix 1.

6.1 Section 1: Standards concerned with calculation of overall energy use in buildings

Since a building generally uses more than one fuel (e.g. gas and electricity), the different energy sources have to be combined in terms of primary energy or CO_2 emissions. This is done in item 2, which gives the basis of converting delivered energy into primary energy or CO_2 emissions, and provides the optional end result of the calculation of energy performance (Article 3 of the Directive).

Item 1+3 (now combined) sets out ways of expressing the energy performance in a certificate (Article 7), and ways of expressing requirements as to the energy performance (Articles 4 to 6).

6.2 Section 2: Standards concerned with the calculation of delivered energy

Standards in this section provide the link between net energy and delivered energy for space heating and cooling, and also the energy requirements for ventilation, hot water and lighting. The uses of energy are calculated separately:

- Space heating – various parts of prEN 14335 (depending on the type of heating system), items 7 to 10. Aspects of heating control systems will generally be incorporated into these standards,. The input to the calculation is the result from EN 832 or EN ISO 13790, or of a dynamic simulation (see Section 3, below).
- Space cooling – item 12. Aspects of air-conditioning control systems will generally be incorporated into this standard,. The input to the calculation is the result from item 14, or of a dynamic simulation (see Section 3, below).
- Domestic hot water – item 11, which includes both the specification of hot water requirements for different types of building, and the calculation of the energy needed to provide it.
- Lighting – item 13, based on installed lighting power and annualised usage according to building type, occupancy and lighting controls.
- Ventilation – items 20/21, energy needed to supply and extract air, based on installed fan power and controls.
- Integrated building automation and controls - item 22, takes into account additional energy optimisation based on interdisciplinary control functions and applications for heating, ventilation, cooling, domestic hot water and lighting.

All of these standards take into account renewable energy sources where appropriate.

Item 4 defines the asset rating and the operational rating, used as the basis for energy certification and energy performance requirements. It includes methods for taking account of measured energy use in existing buildings.

6.3 Section 3: Standards concerned with calculation of net energy for heating and cooling

WI 14 defines two routes to the calculation of the net energy for heating and cooling:

1. Simplified methods based on monthly or hourly calculations and simplified description of the building (in terms of element U-values, etc). The inputs to these calculations are obtained using the standards in Section 4.
2. Detailed numerical calculations. The precise calculation procedure is not specified in the standards: but item 17 provides criteria that should be followed together with tests for the validation of computer software.

These calculations take account of control aspects that affect building gains and losses, such as control of internal temperature, ventilation and solar protection.

6.4 Section 4: Supporting standards

These standards provide the input data for the calculation of net energy use by the methods in Section 3.

6.4.1 Thermal performance of building components

The thermal performance of building components Section 4A includes standards for the calculation of the thermal performance of building components. The overall transmission heat loss coefficient is obtained by EN ISO 13789, which refers to other standards for the calculation of U-values. The standards for U-values fall into two groups:

- simplified methods (EN ISO 6946, EN ISO 13370, EN ISO 10077-1, prEN 13947), which can be used for components within the scope of those standards; and
- detailed methods (EN ISO 10077-2, EN ISO 10211-1, EN ISO 10077-2), which can be used as an alternative, or for cases for which there is not an applicable simplified method.

The U-value of components, including windows and doors, can alternatively be established by measurement according to test methods cited in an applicable product standard.

Thermal bridges (at junctions between elements, etc) are covered in EN ISO 10211-1, EN ISO 10211-2 and EN ISO 14683.

The standards in this group also include those for obtaining thermal values (EN ISO 10456 and EN 12524).

6.4.2 Ventilation and air infiltration

EN 13465 (dwellings) and item 19 (other buildings) provide methods for calculation air flow rates to enable the calculation of heat losses due to air exchange. EN 13779 covers mechanically ventilated buildings (including those with air conditioning).

6.4.3 Overheating and solar protection

Section 4C includes standards for estimating internal temperatures without air-conditioning, and to calculate the effect of solar protection devices. These calculations can be used to determine whether there is a need to consider air conditioning.

6.4.4 Indoor conditions and external climate

Section 4D contains standards related to indoor conditions and specifications for the calculation and presentation of climatic data. [Note: The parts of prEN ISO 15927 do not contain climatic data, but rather a specification for it, so that data in conformance with this standard is on a known basis and a known format.]

6.4.5 Definitions and terminology

EN ISO 7345, EN ISO 9288, EN ISO 9251 and EN 12792 contain definitions of terms and quantities used by other standards.

6.5 Section 5: Standards concerned with monitoring and verification of energy performance

These standards include the determination of air leakage rates and infra-red thermography, which can be used in the verification of the performance of buildings.

There are also items on inspection of heating systems and air conditioning systems, which relate to Articles 8 and 9 of the Directive.

7 Explanation of stage codes

A stage code is indicated for each item in Appendix 1, which indicates the current status of the item. The meaning of the stage codes is as follows.

11 – Work allocated to TC
31 – Working document expected from WG
32 – Working document circulated to TC
33 – CEN Enquiry decided
40 – Document available for CEN Enquiry
41 – CEN Enquiry started
46 – Results of CEN Enquiry established
49 – Document available for Formal Vote
51 – Formal Vote launched
52 – Voting report established (Formal Vote)
53 – Ratified - Publication decided
64 – EN available

Appendix 1: Standards and current Work Items arranged by hierarchy

Man date reference	Work item or Title of standard	Present stage	Stage, end 2004	Respon-sible TC	EN no.	Comment
Section 1 : Standards concerned with calculation of <u>overall energy use</u> in buildings (based on results from standards in section 2)						
1+3	Energy performance of buildings – Methods for expressing energy performance and for energy certification of buildings	31	40	TC 89		Stage 64, 2007
2	Energy performance of buildings – Overall energy use, primary energy and CO_2 emissions	31	40	TC 228		Stage 64, 2007
31	Data requirements for standard economic evaluation procedures, including for renewable energy sources.	31	40	TC 228		Stage 64, 2007
Section 2 : Standards concerned with calculation of <u>delivered energy</u> (based where relevant on results from standards in section 3)						
4	Energy performance of buildings – Assessment of delivered energy use of buildings	31	40	TC 89		Stage 64, 2007
7	Heating systems in buildings – Method for calculation of system energy requirements and system efficiencies – Part 1: General	46	49	TC 228	prEN 14335	Stage 64, 2006
8	Heating systems in buildings – Method for calculation of system energy requirements and system efficiencies – Part 2.1: Space heating emission systems	40	46	TC 228		Stage 64, 2006
9	Heating systems in buildings – Method for calculation of system energy requirements and system efficiencies: Part 2.2.1: Space heating generation – Combustion systems Part 2.2.2: Space heating generation – Heat pump systems Part 2.2.3: Space heating generation – Thermal solar systems Part 2.2.4: Performance and quality of CHP Part 2.2.5: Performance and quality of district heating and large	31	40	TC 228		Stage 64, 2007

Man date refer ence	Work item or Title of standard	Present stage	Stage, end 2004	Respon-sible TC	EN no.	Comment
	volume systems Part 2.2.6: Performance of other renewables (heat and electricity) Part 2.2.7: Space heating generation – Biomass combustion systems					
10	Heating systems in buildings – Method for calculation of system energy requirements and system efficiencies – Part 2.3: Space heating distribution systems	31	40	TC 228		Stage 64, 2007
11	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies – Part 3.1: Domestic hot water systems, including generation efficiency and the tap water requirements	31	40	TC 228		Stage 64, 2007
12	Calculation of room temperatures and of load and energy for buildings with room conditioning	31	40	TC 156		Stage 64, 2007-09
26	Design of embedded water based surface heating and cooling systems	31	40	TC 228		Stage 64, 2006
20+ 21	Ventilation for buildings – Calculation methods for energy requirements due to ventilation systems in buildings	31	40	TC 156		Stage 64, 2007
22	Calculation methods for energy efficiency improvements by the application of integrated building automation systems	31	40	TC 247		Stage 64, 2006
13	Energy performance of buildings – Energy requirements for lighting	31	40	TC 169		Stage 64, 2006
Section 3 : Standards concerned with calculation of <u>net energy for heating and cooling</u>						
15	Thermal performance of buildings – Calculation of energy use for space heating	64	64	TC 89	EN ISO 13790	

Man date refer ence	Work item or Title of standard	Present stage	Stage, end 2004	Respon- sible TC	EN no.	Comment
14	Energy performance of buildings – Calculation of energy use for space heating and cooling	31	40	TC 89		Stage 64, 2007 Based on EN ISO 13790
16	Thermal performance of buildings – Sensible room cooling load calculation – General criteria and validation procedures	32	40	TC 89		Stage 64, 2006
17	Energy performance of buildings – Calculation of energy use for space heating and cooling – General criteria and validation procedures	32	40	TC 89		Stage 64, 2006
Section 4 : Standards to support the above						
4A : Thermal performance of building components						
23	Thermal performance of buildings – Transmission and ventilation heat transfer coefficients – Calculation method	(64) 33	(64) 41	TC 89	EN ISO 13789	Under review
23	Thermal performance of building components – Dynamic thermal characteristics – Calculation methods	(64) 33	(64) 41	TC 89	EN ISO 13786	Under review
24	Building components and building elements – Thermal resistance and thermal transmittance – Calculation method	(64) 32	(64) 40	TC 89	EN ISO 6946	Under review
24	Thermal performance of buildings – Heat transfer via the ground – Calculation methods	(64) 32	(64) 40	TC 89	EN ISO 13370	Under review
-	Thermal performance of curtain walling – Calculation of thermal transmittance – Simplified method	46	51	TC 89	prEN 13947	Stage 64, 2005
23	Thermal performance of windows, doors and shutters – Calculation of thermal transmittance – Part 1: General	(64) 41	(64) 46	TC 89	EN ISO 10077-1	Under review
-	Thermal performance of windows, doors and shutters – Calculation of thermal transmittance – Part 2: Numerical method for frames	64	64	TC 89	EN ISO 10077-2	

Man date refer ence	Work item or Title of standard	Present stage	Stage, end 2004	Respon-sible TC	EN no.	Comment
24	Thermal bridges in building construction – Calculation of heat flows and surface temperatures – Part 1: General methods	(64) 32	(64) 40	TC 89	EN ISO 10211-1	Under review
24	Thermal bridges in building construction – Calculation of heat flows and surface temperatures – Part 2: Linear thermal bridges	(64) 32	(64) 40	TC 89	EN ISO 10211-2	Under review
24	Thermal bridges in building construction – Linear thermal transmittance – Simplified methods and default values	(64) 32	(64) 40	TC 89	EN ISO 14683	Under review
24	Building materials and products – Procedures for determining declared and design thermal values	(64) 32	(64) 40	TC 89	EN ISO 10456	Under review
-	Building materials and products – Hygrothermal properties – Tabulated design values	64	64	TC 89	EN 12524	
4B : Ventilation and air infiltration						
18	Ventilation for buildings – Calculation methods for the determination of air flow rates in dwellings including infiltration	64	64	TC 156	EN 13465	
19	Ventilation for buildings – Calculation methods for the determination of air flow rates in buildings including infiltration	31	40	TC 156		Extended version of EN 13465
25	Ventilation for non residential buildings – Performance requirements for ventilation and room conditioning systems.	49	64	TC 156	EN 13779	Under revision
4C : Overheating and solar protection						
27	Thermal performance of buildings – Calculation of internal temperatures of a room in summer without mechanical cooling – General criteria and validation procedures	52	53	TC 89	prEN ISO 13791	Stage 64, 2005
28	Thermal performance of buildings – Calculation of internal temperatures of a room in summer without mechanical cooling – Simplified methods	52	53	TC 89	prEN ISO 13792	Stage 64, 2005
-	Solar protection devices combined with glazing – Calculation of solar and light transmittance – Part 1: Simplified method	64	64	TC 89	EN 13363-1	

Man date refer ence	Work item or Title of standard	Present stage	Stage, end 2004	Respon-sible TC	EN no.	Comment
-	Solar protection devices combined with glazing – Calculation of solar and light transmittance – Part 2: Detailed calculation method	46	64	TC 89	prEN 13363-2	Stage 64, 2004-12
4D : Indoor conditions and external climate						
-	Design criteria and the indoor environment	64	64	TC 156	CR 1752	
31	Criteria for the indoor environment, including thermal, indoor air quality (ventilation), light and noise	31	40	TC 156		Stage 64, 2007
-	Hygrothermal performance of buildings – Calculation and presentation of climatic data – Part 1: Monthly and annual means of single meteorological elements	64	64	TC 89	EN ISO 15927-1	
-	Hygrothermal performance of buildings – Calculation and presentation of climatic data – Part 2: Hourly data for design cooling load	33	40	TC 89	prEN ISO 15927-2	State 64, 2006
-	Hygrothermal performance of buildings – Calculation and presentation of climatic data – Part 3: Calculation of a driving rain index for vertical surfaces from hourly wind and rain data	46	40	TC 89	prEN ISO 15927-3	State 64, 2006
-	Hygrothermal performance of buildings – Calculation and presentation of climatic data – Part 4: Hourly data for assessing the annual energy for heating and cooling	46	64	TC 89	prEN ISO 15927-4	Stage 64, 2005
-	Hygrothermal performance of buildings – Calculation and presentation of climatic data – Part 5: Data for design heat load for space heating	46	64	TC 89	prEN ISO 15927-5	Stage 64, 2005
-	Hygrothermal performance of buildings – Calculation and presentation of climatic data – Part 6: Accumulated temperature differences (degree days)	33	40	TC 89	prEN ISO 15927-6	State 64, 2006

Man date reference	Work item or Title of standard	Present stage	Stage, end 2004	Respon-sible TC	EN no.	Comment
4E : Definitions and terminology						
-	Thermal insulation – Physical quantities and definitions	64	64	TC 89	EN ISO 7345	
-	Thermal insulation – Heat transfer by radiation – Physical quantities and definitions	64	64	TC 89	EN ISO 9288	
-	Thermal insulation – Heat transfer conditions and properties of materials – Vocabulary	64	64	TC 89	EN ISO 9251	
-	Ventilation for buildings – Symbols, terminology and graphical symbols	64	64	TC 156	EN 12792	
Section 5 : Standards concerned with monitoring and verification of energy performance						
-	Ventilation for buildings – Test procedures and measuring methods for handing over installed ventilation and air conditioning systems	64	64	TC 156	EN 12599	Deals with the setting to work /commissioning of new ventilation/ air conditioning systems in non dwellings. It provides a starting point for on going monitoring of the building
-	Thermal performance of buildings – Determination of air permeability of buildings – Fan pressurization method	64	64	TC 89	EN 13829	Method to verify energy performance of buildings
-	Thermal performance of buildings – Determination of air change in buildings – Tracer gas dilution method	64	64	TC 89	EN ISO 12569	Method to verify energy performance of buildings
-	Thermal performance of buildings – Qualitative detection of thermal irregularities in building envelopes – Infrared method	64	64	TC 89	EN 13187	Method to verify energy performance of buildings

Mandate reference	Work item or Title of standard	Present stage	Stage, end 2004	Respon-sible TC	EN no.	Comment
5	Heating systems in buildings – Inspection of boilers and heating systems	31	40	TC 228		
30	Ventilation for buildings – Energy performance of buildings – Guidelines for the inspection of ventilation systems	31	40	TC 156		
6	Ventilation for buildings – Energy performance of buildings – Guidelines for the inspection of air-conditioning systems	31	40	TC 156		