Energy Performance of Buildings

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**PROJECT DOCUMENT**

**Status: PUBLIC**

# Set of recommendations: Towards a second generation of CEN standards related to the Energy Performance of Buildings Directive (EPBD)

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**CENSE_WP6.1_NO5rev02** **May 27, 2010**

## IEE-CENSE

***Leading the CEN Standards on Energy performance of buildings to practice***
***Towards effective support of the EPBD implementation and acceleration in the EU Member States***

**Supported by**

Intelligent Energy Europe

Contract EIE/07/069/SI2.466698

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# Contents

**See also separate report: Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD):**

A separate CENSE report has been published with both summarized and detailed information on the background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD). Both documents can be found on the CENSE-website http://www.iee-cense.eu:

CENSE WP6.1 N03, *Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD)*, April 29*), 2009.

CENSE WP6.1 N03A, Annexes to report *Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD)*, April 29*), 2009.

In addition, a series of Information Papers was published on specific CEN-EPBD standards. These Information Papers can be downloaded from the CENSE website.

These information papers have been compiled into 5 booklets introducing the CEN standards, downloadable from the website.

**Disclaimer:**

CENSE has received funding from the Community's Intelligent Energy Europe programme under the contract EIE/07/069/SI2.466698.

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# 1 Executive summary

**The CENSE project**

The aim of the CENSE project (2007-2010) is to support the EU Member States (MS) and other target groups in achieving better awareness and more effective use of the European (CEN) standards that are related to the Energy Performance of Buildings Directive (EPBD).

The main activities in the project are to provide guidance on the standards, to collect comments and examples of good practice, so as to remove obstacles to implementation and to prepare recommendations to CEN.

**The CEN standards to support the EPBD**

The set of CEN (CEN-ISO) standards developed under the European Commission's mandate to CEN to support the EPBD were successively published in the years 2007-2008 and are currently either already being implemented or will soon (at least partially) be implemented in many EU Member States.

The initial time schedule for the development of these "first generation" standards was very short. Consequently, it should not come as a surprise that an update, a "second generation" of standards, is needed.

**Conclusions and recommendations**

This CENSE report contains a set of conclusions and recommendations, based on feed back from and discussion with the target groups.

**Questions to be addressed**

*- What remains to be done to realise the full potential of the standards?*

*- How to combine efforts to bring the standards to application?*

The response via questionnaires and workshops prove that there is a wide interest by many target groups in Europe, comprising industry, professionals, standard writers, software companies, but also consumers' organisations.

Main conclusions are the following:

- There is a strong interest in a second generation of EPBD - CEN standards to assess the energy performance of buildings. Based on the experience of the first generation, a second generation is needed to facilitate the implementation in the EU Member States, to disseminate the European experience as a support to the European Industry and to enhance harmonization at global level (bring CEN standards to ISO).
- There is a need of positive signals towards a European common methodology.

**Second generation of EPBD - CEN standards**

The first generation of CEN standards to support the EPBD were published in the years 2007-2008 and were implemented in many EU Member States "in a practical way", mixed with national procedures, boundary conditions and input data.

The CENSE project prepared recommendations to CEN to develop a second generation of standards in the coming years.

The current standards present possible methodologies, which makes direct implementation on a national level nearly impossible. A Member State can only develop a calculation procedure based on

the EN standard method of choice. This results in large differences in the final energy performance of buildings calculation procedures across countries.

What is needed is a second generation which presents calculation procedures with a clear indication of what values or procedures should be given in National Annexes. This has to promote direct use of the standards resulting in European uniformity.

As a consequence, some concrete recommendations are the following:

- A more uniform structure for each of the standards in the package.
    - With a distinction between common procedures and options to be chosen at national level; this will bring more clarity in the adoption of the procedures and the specific choices per country;
    - Fully spelled out equations and unambiguous links between input and output, making the standards ready-to-use for validation and software preparation;
- Use of the available common set of terms, definitions and symbols & subscripts, the latter also for all versions and national application documents in other languages.
- Rationalisation of the number of options given in the standards, each option aiming at specific applications with respect to availability of input data and impact on the energy performance.
- Preparation of an overall continuous but modular structure, e.g. in the form of a basic standard on the integrated energy performance of buildings, re-using the main elements of EN 15603 (Overall energy use and definition of energy rating) and core elements of other key standards, including common definitions, terms and symbols, enabling a step-by-step implementation by the Member States, taking also into account the nature of each procedure identifying the typical type of user. Preparing and applying a systematic hierarchic numbering of the standards of the set clould be an additional asset.
- It is important to send clear messages on the work being done and the timeline, to enable national standard writers and policy makers to participate actively in the process and to plan the implementation in the national or regional procedures/building regulations.
- Per cluster of standards on a specific subject technical recommendations have been prepared by the CENSE teams who focused on a specific subset of the CEN-EPBD standards. These technical recommendations can be found in the separate reports.

The revision of the standards and a corresponding revision of national methods and regulations will within the next five years enable the EU Member States to make a more direct use of the harmonized CEN procedures.

There is also a strong interest in ISO in the subject, which culminated in the recent (June 2009) establishment of a Joint Working Group in ISO to develop ISO (EN ISO) standards on energy performance of buildings, using the EPBD - CEN standards as a basis. This creates a unique opportunity for Europe to retain the lead on the preparation of energy performance standards in a combined CEN-ISO effort.

A positive signal is also noted from the Commission. There is a growing chance for a second mandate to CEN related to the EPBD. In this context, DG ENER has high expectations for the outcome from the CENSE project.

**The need of positive signals towards a European common methodology**

Various target groups underline the benefits of a Europe wide unified framework (knowledge share, avoid of duplications of efforts, fair competition, more transparency and better chances for innovation).

The first EPBD – CEN package has in general already a good quality compared to national methods. The quality and usability would be increased by the second generation.

But how to get the Member States to make the switch from their national method, in which also a lot of effort has been invested (e.g. training of the professionals) to the European method, especially on a short notice?

To bring the EPBD – CEN package to application there are several options. There are substantiated hesitations from the side of the Commission to enforce a 100% mandatory application. But waiting until the national methods are voluntarily replaced by the European methods is another extreme position. A third option, using the market forces, could lead to a soft convergence of national and the European method. In this option, a methodology, based on the EPBD - CEN package, should be admitted in parallel to the national method, to fulfil the national building codes requirements. The justification would be that national monopolistic positions for methodologies and software are not compatible with the objective of a European market. At the same time it would stimulate countries to write National Annexes or National Application Documents if and where they fear that the parallel routes would lead to different results.

But a neater and better organized second generation of CEN standards will be necessary to make this a feasible option in practice.

A contribution to the perspective of EU-wide application of the EPBD-CEN standards, is the expectation that the comparative methodology framework to identify cost-optimal levels of energy performance requirements for buildings and building elements, an important element in the EPBD recast, should be based on European standards (recast annex III).

## 2 Introduction

In the European project CENSE (www.iee-cense.eu) experiences on the implementation of the CEN (CEN-ISO) standards to support the EPBD were gathered and analyzed, with the aim to come up with recommendations for the revision of the standards in the coming years.

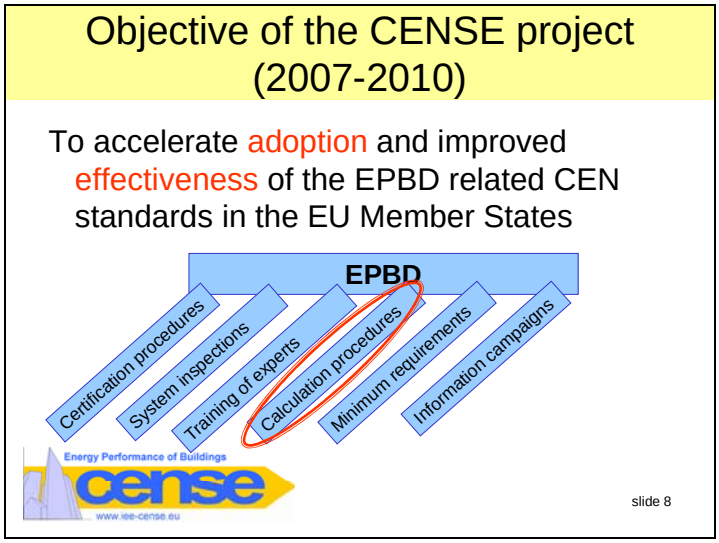


**Fig 2.1 – CENSE focuses on specific aspects of the EPBD implementation, mainly on the calculation procedures; other aspects are covered in other projects, for example in parallel projects under the Intelligent Energy Europe programme.**

This CENSE project document is the final report based on feed back from and discussion with the target groups on the implementation and practical use of the CEN standards in the national or regional building regulations.

This document contains observations and recommendations, among others based on analysis and feed back in the CENSE project on the national implementation of the ISO and/or CEN standards on the energy performance of buildings in Europe. These recommendations will be addressed to CEN, for the preparation of a second generation of CEN (CEN-ISO) standards on energy performance of buildings.

More information: www.iee-cense.eu.

# 3 Background and status of CEN-EPBD standards

The set of CEN (CEN-ISO) standards developed under the European Commission's mandate to CEN to support the EPBD was successively published in the years 2007-2008. The standards are currently either already implemented or will soon (at least partially) be implemented in many EU Member States.

The initial time schedule for the development of these "first generation" standards was very short. Consequently, it should not come as a surprise that an update, a "second generation" of standards, is needed.

Within the CENSE-project, a separate report with additional annexes was published with both, summarized and detailed information on the background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD). Both documents can be found on the CENSE-website http://www.iee-cense.eu:

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CENSE WP6.1 N03A, Annexes to report *Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD)*, April 29*), 2009.

For the convenience of the reader, the **summary information** from that report was copied in this report as **Annex C**. This annex also shows the different elements involved in the assessment of the overall energy performance of a building, including the technical building systems. This comprises a number of successive steps, which can be schematically visualized as a **pyramid**. (see figure 3.1)

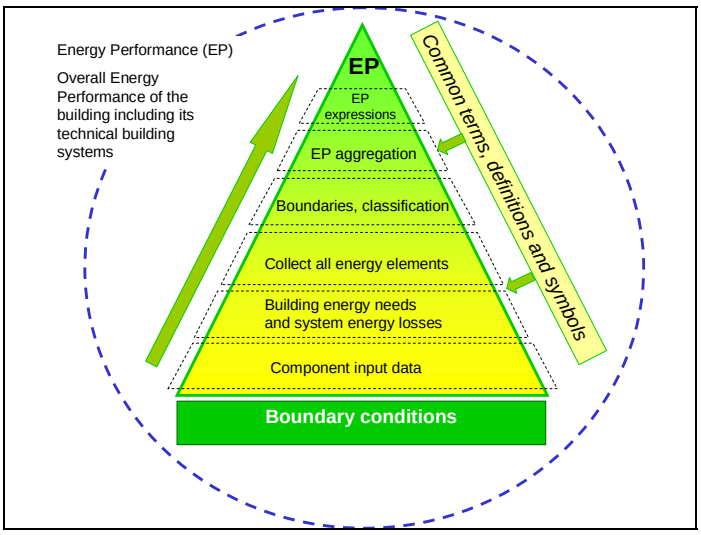



**Fig. 3.1 - Overall building energy performance**

In addition, a series of Information Papers was published on specific CEN-EPBD standards. These Information Papers can be downloaded from the CENSE website.

These information papers have been compiled into 5 booklets introducing the CEN standards, downloadable from the website, see [3]-[7].

## 4 Why European harmonization?

In a nutshell:

| **Benefits of a Europe wide harmonized methodology:** | **If Member States decide to go their own way:** |
|---|---|
| — More effective maintenance, development and validation of methods compared to separate methods in 27 Member States (while Member States, via National Annexes, keep the possibility to respond to local developments)<br>— Easier wide scale implementation of new technical solutions, equipment and systems, because the type of input data will be more harmonized.<br>— For European industry:<br>  — Bigger market throughout Europe<br>  — Additional benefits and opportunities on the world market<br>— Free circulation of services<br>— Uniformity for internationally operating property owners / corporations with respect to the evaluation of the energy performance (actual and potential) of their properties<br>— More opportunities for shared research | — Less international dissemination of good practice and know-how in energy performance assessment methodologies, (because a common base of discussion is missing)<br>— Less international circulation of products and services (because the link to the building energy performance is an important sales argument)<br>— Less international exchange of experiences to increase quality of energy performance and certification schemes<br>— No use of common databases<br>— No use of common validation tools or software (leading to 27 x re-inventing the wheel)<br>— Less credibility of EU energy issues in the world |
| **But at same time: Room needed for national input data and boundary conditions:** | |
| — Climate data<br>— Building traditions<br>— Legal context<br>— Occupant / user behaviour | ***See more details further on*** |

# 5 Major requirements for the set of international standards on energy performance of buildings

## 5.1 Introduction

The work ahead for CEN (and ISO) will be challenging, developing a second generation of CEN(-ISO) standards which fulfills the needs and expectations. In the following the main requirements for the set of international standards on energy performance of buildings are presented in brief.

## 5.2 Fit for use in context of national or regional building regulations

A prime application of the standards is to check compliance with (national) minimum overall **energy performance requirements**, and to **classify** buildings in terms of energy quality and potential for improvement. This requires **transparent and verifiable, unambiguous, robust and reproducible** procedures, which is typically different from standards that provide guidelines for design.

In addition, the procedures should allow handling **national differences** in climate data, building traditions, occupant behaviour and national choices imposed by national or regional building regulations.

It is a challenge to find the right balance between sometimes conflicting quality criteria, depicted in figure 5.1.

- ➔ The optimum balance depends on national situation and type of application
- ➔ At certain level, flexibility is required to accommodate specific national situations

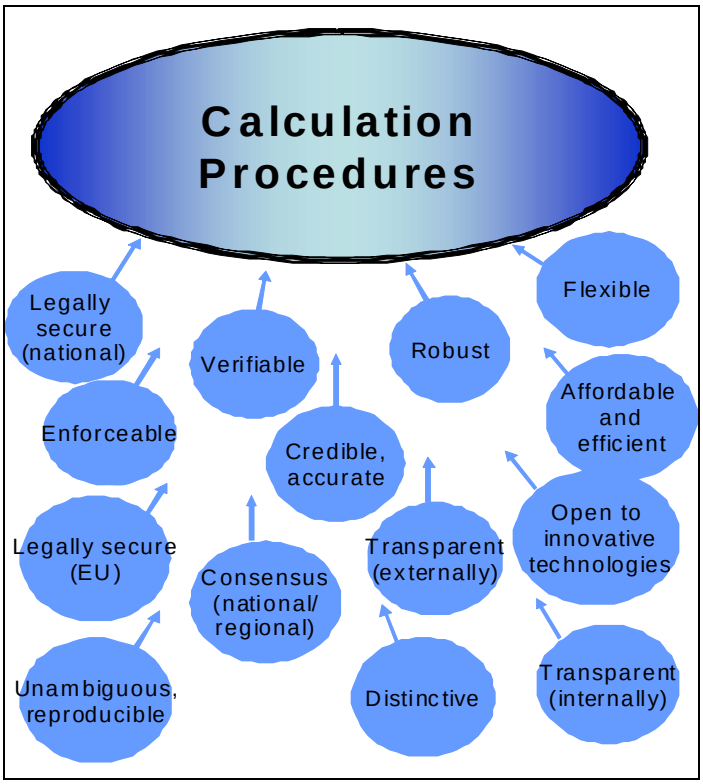



**Fig. 5.1 - Balance needed between sometimes conflicting quality criteria** *(picture from EPBD Buildings Platform Info paper P26)*

Examples of such specific national situations:

| **Possible differences between countries/regions, on use of energy performance methods in the context of building regulations:** | |
|---|---|
| Climate data: Obvious… | Legal context: |
| Building traditions, cultural differences: | Links with other regulations, e.g. |
| Use of attic and cellar: Living space? Storage? … | Indoor air quality ➔ ventilation needs |
| Average size of conditioned floor area per person… | Definition and size of conditioned floor area |
| | Definition of building and use of building spaces |
| Market penetration (and price…) of new products/technologies… | Daylight & view from office spaces |
| Architectural traditions, … | Type of government control: |
| Occupant/user behaviour | On building design? Or on realized building? |
| National policy: | Penalties? |
| Conversion factors | Strict control or not? |
| Electricity (oil, wood, ..) ➔ Primary energy and/or $CO_2$, … | ➔ Effect on relevance of detailed input |
| | ➔ Effect on actual compliance |
| Which energy uses included | Status of regulations: |
| Cooling? Appliances? | Energy label purely informative or linked to mandatory measures (improvement) or incentives (subsidies, cheaper mortgages, ..)? |
| Differences in Rating scales (A-G, 0-100, …) | |
| Continued next column: | |

# 6 Practical use of the CEN standards in the Member States; current situation

## 6.1 CEN-EPBD standards not mandatory in national/regional building regulations

The commission supported the development of the present CEN standards by giving a mandate to CEN to produce the standards needed to support the implementation of the EPBD. It will be beneficial for Europe if all Member States use these standards as a reference.

However, building regulation is an area where the EU Member States claim their national privilege to formulate the national legislation. The EPBD adopted the subsidiarity principle in this respect.

Unlike e.g. for the CEN standards under the Construction Products Directive (CPD), the use of the CEN standards to support the EPBD in the context of national or regional building regulations is not mandatory.

The time schedule for the development of the "first generation" CEN-EPBD standards was extremely short. At the same time, many Member States had only limited or no experience with overall energy performance requirements and certification, which led to a wide variety of expectations with regard to the required tools. A third factor was the phase difference between the national implementation of the EPBD and the mandate to CEN.

Consequently, the CEN standards under the first mandate were implemented in many EU Member States "in a practical way". Typically: partly copied in "all in one" national standards or national legal documents, mixed with national procedures, boundary conditions and input data.

Due to the variety and partly uncertainty of the initial wishes from the Member States, most of the CEN-EPBD standards contain loosely formulated procedures, open for choice at national or regional levels. For a more direct implementation of the CEN-EPBD standards in the national and regional building regulations, it is necessary to reformulate the content of the standards so that they become on the one hand unambiguous (the actual harmonized procedures), with on the other hand a clear and explicit overview of the choices, boundary conditions and input data that need to be defined at national or regional level. Such national or regional choices remain necessary, due to differences in climate, culture & building tradition, policy and legal frameworks.

More information on these issues can be found in the Buildings Platform Information Papers on the CEN standards: P02, P40 and P60, which can also be downloaded from the website www.iee-cense.eu.

### 6.2 Current practical use in the Member States

Although most Member States say they use the CEN standards as a basis, most of the Member States do not require the direct use of these standards, for reasons mentioned above. Different practical solutions are possible, for each CEN standard or group of CEN standards. In some Members States part of the content will be found in national publications or regulations, in some other Member States using the EPBD standards is always an alternative accepted solution.

## 7 Recommendations from CENSE

### 7.1 Introduction

The following are observations and recommendations from CENSE:

The following paragraphs give only suggestions, and are not intended in whatever way to interfere in the discussion and decisions in CEN and/or ISO, where also other considerations may play an important role.

The current CEN(-ISO) standards to support the EPBD present possible methodologies, which makes direct implementation on a national level nearly impossible. A Member State can only develop a calculation procedure based on the EN standard method of choice. This results in large differences in the final energy performance of buildings calculation procedures across countries.

What is needed is a second generation which presents calculation procedures with a clear indication of what values or procedures should be given in National Annexes. This has to promote direct use of the standards resulting in European uniformity.

The following paragraphs contain concrete recommendations in this direction.

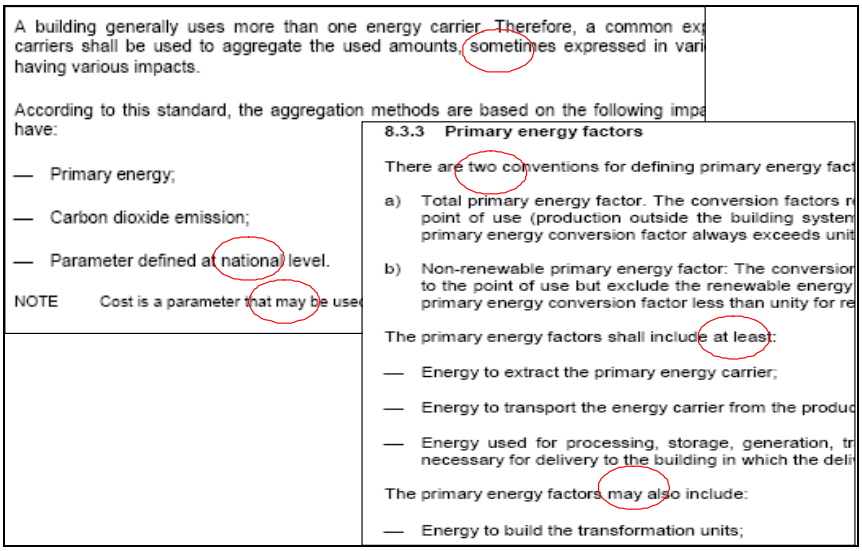
## 7.2 Common structure for each standard, with a clear separation of common procedures and national choices

**Main recommendation 1:** Develop a common structure for each standard, with a clear separation of common procedures in the main document and national choices in form of an annex. With a special format for the specification of the national choices.

**Background:**

As shown above, the procedures to assess the energy performance of buildings should be unambiguous, but also allow handling national differences. The current CEN and EN-ISO standards for the assessment of the energy performance of buildings typically contain an entangled mix of common procedure and national choices, as shown in the following example.

Example:



A building generally uses more than one energy carrier. Therefore, a common ex carriers shall be used to aggregate the used amounts, sometimes expressed in vari having various impacts.

According to this standard, the aggregation methods are based on the following impa have:

— Primary energy;

— Carbon dioxide emission;

— Parameter defined at national level.

NOTE Cost is a parameter that may be use

8.3.3 Primary energy factors

There are two conventions for defining primary energy fact

a) Total primary energy factor. The conversion factors r point of use (production outside the building systen primary energy conversion factor always exceeds unit

b) Non-renewable primary energy factor: The conversion to the point of use but exclude the renewable energy primary energy conversion factor less than unity for re

The primary energy factors shall include at least:

— Energy to extract the primary energy carrier;

— Energy to transport the energy carrier from the produc

— Energy used for processing, storage, generation, tr necessary for delivery to the building in which the deli

The primary energy factors may also include:

— Energy to build the transformation units;

**Fig. 7.1 – Example of unwanted entangled mix of common procedures and national choices as found in many of the CEN-(ISO)-EPBD standards. This example is from EN 15603**

As several EU Member States **implemented** the 1st generation CEN-(ISO)-EPBD standards **"in a practical way"**, specific parts are copied in the national or regional method, either a national standard or another national document that is part of the national or regional building regulations. The CEN-(ISO)-EPBD standards are not directly implemented and it is very difficult to find out which parts of it are implemented at national/regional levels.

**Example:**

In several countries selections from the main content of EN-ISO 13790:2008 are used in the national method, but re-edited and mixed with national choices, boundary conditions and input data:

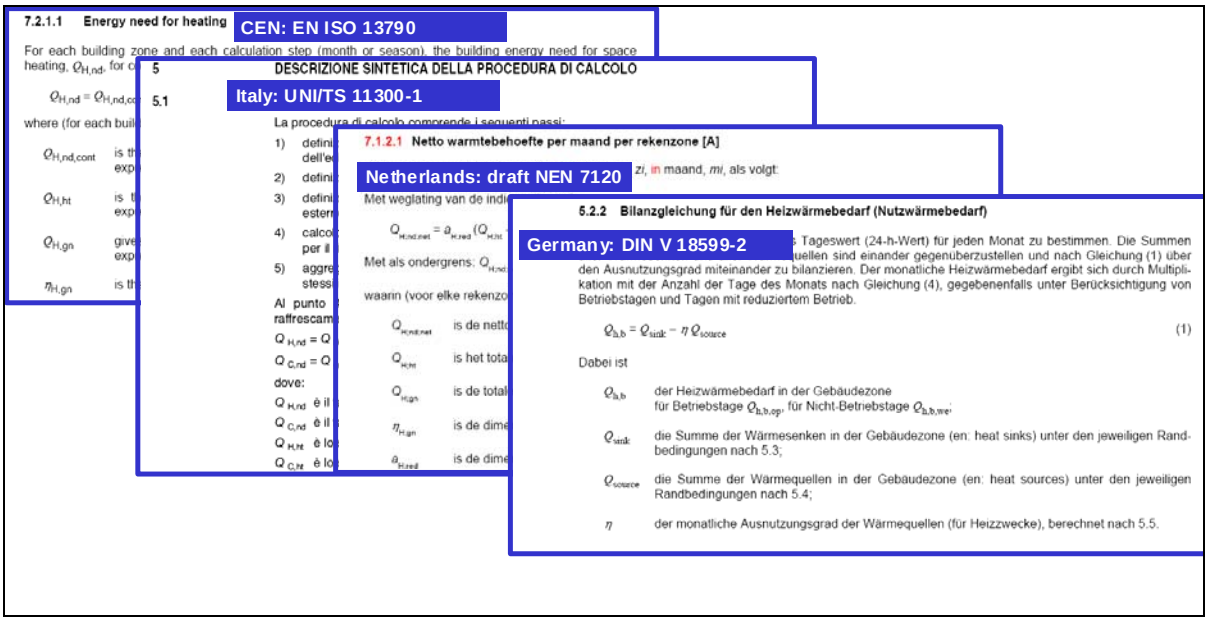
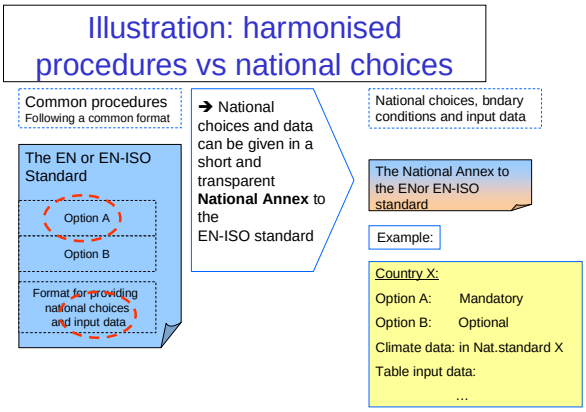
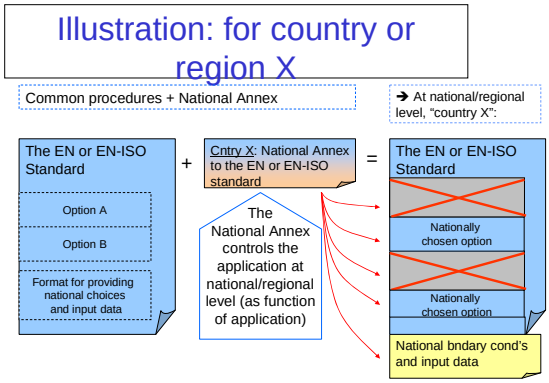



**Fig. 7.2 – Example: current practical applications of EN ISO 13790 (Energy use for heating and cooling) in different countries**

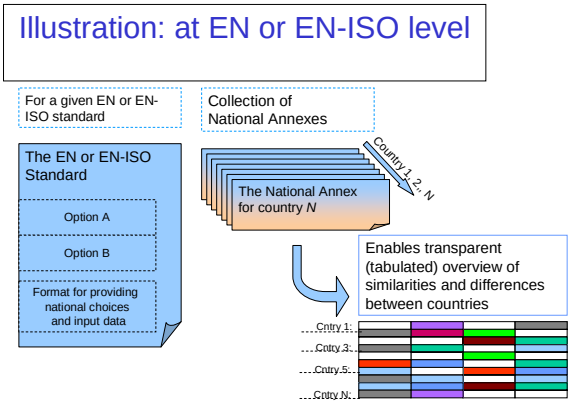
*Solution:* Develop a common structure for each standard, with a clear separation of common procedures in the main document and national choices and input data in the form of easily accessible and comparable national annexes (fig. 7.3a). With a special format for the specification of the national choices (example: fig.7.5). And by publishing the collection of national annexes as a separate part of the standard, at more regular intervals, these can be kept up to date more easily (fig. 7.3d).



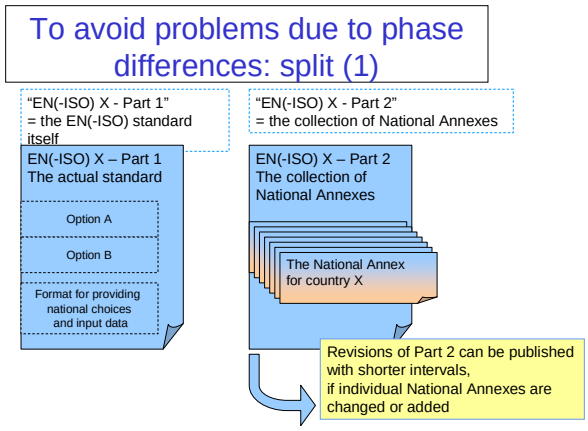

a) Restructure each standard: clear separation of harmonised procedures from the choices, boundary conditions and input data to be decided at national level




b) At national level the CEN (-ISO) standard plus national annex applies




c) At European level this will make comparison between countries feasible




d) The collection of national annexes for a specific CEN (-ISO) standard may be published as a separate part, at more regular intervals

**Fig. 7.3 – Recommended common structure for 2nd generation of CEN-(ISO)-EPBD standards**

Advantages:

This will make it possible to use the international standard directly ("plug and play"), with a short and clear national annex that provides the national or regional choices on boundary conditions and input data. These national annexes, in turn, will make an international comparison of methodology and input data more easy and transparent (see fig. 7.3c).

It will facilitate a check if a national or regional procedure is in agreement with the international standard.

It will make both, the use and the future development of the standard, based on inventory of national/regional needs, much more efficient and increase the involvement/commitment of the countries in the development.

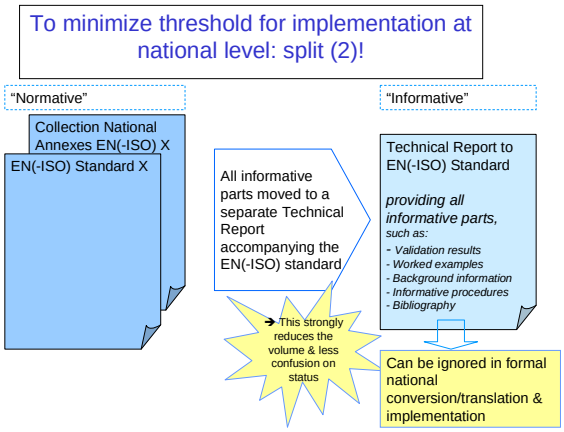
Suggested action within or after CENSE: Prepare examples of a possible common structure

**In addition**, to further facilitate adoption (including translation) at national or regional level:

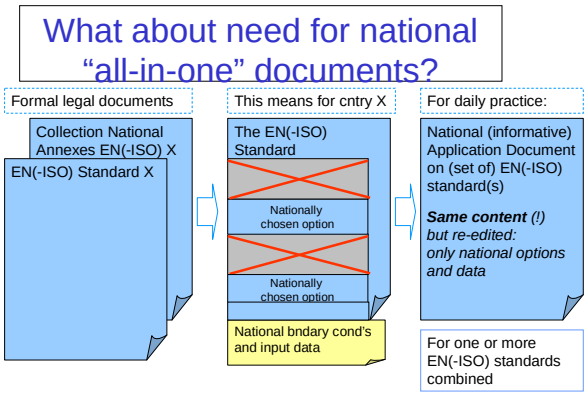
— It might be considered to **move content** that only relate to **design** to specific design support standards.

— It might be considered to **move informative annexes** to a separate Technical Report (fig. 7.4a).

Often, for **daily use**, there may be a need for a **practical national/regional application document** in which all elements are integrated. The illustration in fig. 7.4b shows a possible way to deal with this.




a) Move all informative parts and informative annexes to an accompanying Technical Report; and make specific sections obligatory: internal validation test results, worked example, ..




b) At national level an "all-in-one" document, for daily practice, can be constructed from the CEN(-ISO) standards plus national annexes

**Fig. 7.4 – A possibility to match need for common procedures and need for national choices**

**Possible improvement:** add **tabulated** overview of the choices to be made at national level

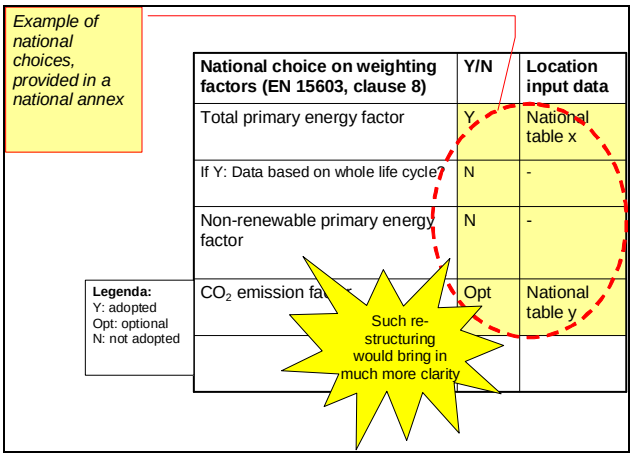



**Fig. 7.5 – Possible improvement: add tabulated overview of the choices to be made at national level**

## 7.3 Unambiguous and validated sets of equations

**<u>Main recommendation 2:</u> Spell out all equations and provide all I/O links between equations; add a spreadsheet with worked example(s)**

***Background:*** Various standards provide details of the required calculations, but the overall equations and the links (input-output) between the equations are missing.

***Problem***: Consequently, the equations have to be worked out at national or regional level. This unnecessarily **hinders** the direct use of these international standards at national or regional level. It **hinders** a check if national or regional procedure is in agreement with the EN (EN-ISO) standard. It **hinders** the validation of the procedures and the preparation of software.

***Solution:***

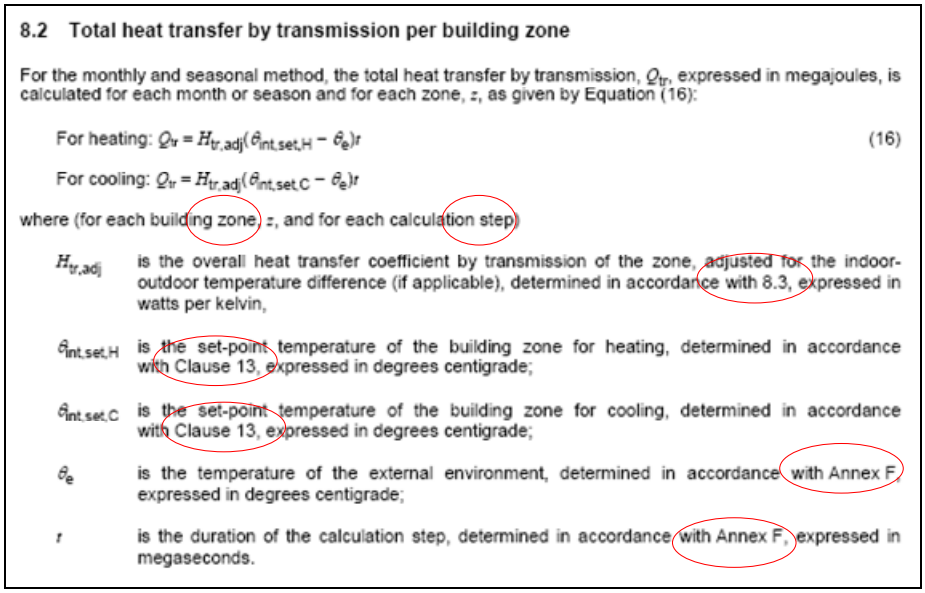
Spell out all equations and provide all I/O links between equations. In addition: each calculation procedure should be accompanied with a spreadsheet with worked examples, to validate the relations (input → calculation → output) and to facilitate the application and software preparation.

**Advantages:**

This will remove one grave obstacle against the direct use of the international standards at national or regional level. It will make it possible to validate the procedures at international level and to prepare (common) software.

**Example:**

The following example shows a fully spelled out equation, with unambiguous references and (S.I.) units for each variable.



**8.2 Total heat transfer by transmission per building zone**

For the monthly and seasonal method, the total heat transfer by transmission, $Q_{tr}$, expressed in megajoules, is calculated for each month or season and for each zone, $z$, as given by Equation (16):

For heating: $Q_{tr} = H_{tr,adj}(\theta_{int,set,H} - \theta_e)t$ (16)

For cooling: $Q_{tr} = H_{tr,adj}(\theta_{int,set,C} - \theta_e)t$

where (for each building zone, $z$, and for each calculation step)

$H_{tr,adj}$ is the overall heat transfer coefficient by transmission of the zone, adjusted for the indoor-outdoor temperature difference (if applicable), determined in accordance with 8.3, expressed in watts per kelvin,

$\theta_{int,set,H}$ is the set-point temperature of the building zone for heating, determined in accordance with Clause 13, expressed in degrees centigrade;

$\theta_{int,set,C}$ is the set-point temperature of the building zone for cooling, determined in accordance with Clause 13, expressed in degrees centigrade;

$\theta_e$ is the temperature of the external environment, determined in accordance with Annex F, expressed in degrees centigrade;

$t$ is the duration of the calculation step, determined in accordance with Annex F, expressed in megaseconds.

**Fig. 7.6 – Good example of fully spelled out equations (from EN-ISO 13790:2008)**

## 7.4 Use of common symbols, terms and definitions

**<u>Main recommendation 3:</u> Use set of common symbols, terms and definitions in all CEN-(ISO)-EPBD standards on energy performance of buildings**

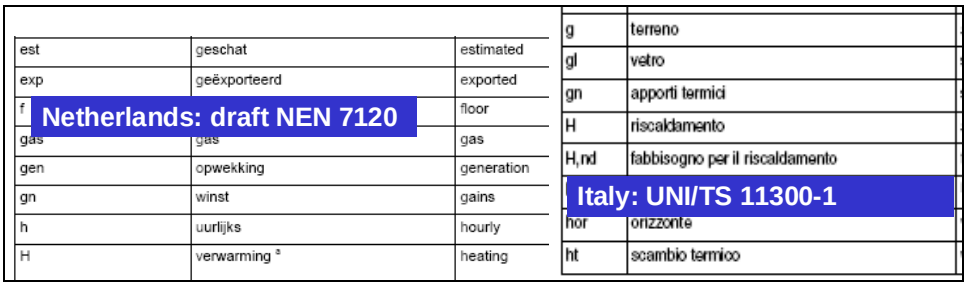
***Background:***

A set of common symbols, terms and definitions is available and already in many of the CEN standards to support the EPBD, including some EN-ISO standards, such as EN ISO 13790:2008, but not yet in all standards that are used as basis for a second generation of international standards on the assessment of the energy performance of buildings.

***Solution:***

Use the set of common symbols, terms and definitions for all CEN-(ISO) standards in the whole set of standards on the energy performance of buildings (illustrated by the pyramid, shown in fig. 3.1). And strongly recommend that the same set is also used in national/regional application documents, even in other languages.

**Good examples:**




| | | |
|---|---|---|
| est | geschat | estimated |
| exp | geëxporteerd | exported |
| f | | floor |
| gas | gas | gas |
| gen | opwekking | generation |
| gn | winst | gains |
| h | uurlijks | hourly |
| H | verwarming [a] | heating |

| | |
|---|---|
| g | terreno |
| gl | vetro |
| gn | apporti termici |
| H | riscaldamento |
| H,nd | fabbisogno per il riscaldamento |
| hor | orizzonte |
| ht | scambio termico |

**Fig. 7.7 – Good examples of application of common symbols and subscripts, also in national application documents, even in other languages**

## 7.5 Rationalisation of options

**<u>Main recommendation 4:</u> Rationalisation of the number of options given in the standards.**

***Problem:*** The current set of CEN(-ISO) standards often offer several options to choose at national or regional level, depending for example on the local climate, culture and application. Moreover, the EU Member States expect sufficient accuracy of the procedures in order to obtain realistic energy figures, also in case of buildings with complex e.g. dynamic technologies, but no overcomplication. At the same time they expect that the procedures are robust, reproducible and usable in practice, also in case of limited availability of input data, e.g. in old existing buildings. This requires that the procedures still enable a choice between different options, but these options need to be rationalized, each option intended for a specific application.

***Solution:*** The procedures have to enable a choice between different options, but these options need to be rationalized, each option intended for a specific application. This would be facilitated by the main recommendations 1 and 5. Also important is that inputs and outputs match between options, to avoid input-output mismatch between different options from different standards. A balance is needed to avoid that harmonization hinders countries to respond promptly to new local developments.

## 7.6 Prepare a systematic, clear and comprehensive overall continuous but modular structure

**Main recommendation 5: Prepare a systematic, clear and comprehensive overall, continuous but modular structure**

***Problem:*** The current set of standards had to be developed in a very short time, with no possibility to develop a clear program of requirements in collaboration with the Member States.

***Solution:*** In combination with the previous main recommendations: The preparation of a **continuous but modular overall structure**, covering all items related to the energy performance of buildings, providing the overall framework which will enable a step-by-step implementation by the EU Member States. For instance, by preparing a **basic standard** on the integrated energy performance of buildings, re-using the main elements of **EN 15603** (Overall energy use and definition of energy rating) and core elements of other key standards, including common definitions, terms and symbols, offering a systematic, clear and comprehensive continuous but modular structure, enabling a step-by-step implementation by the Member States, taking also into account the nature of each procedure identifying the typical type of user.
Preparing and applying a systematic hierarchic **numbering** of the standards of the set clould be an additional asset.

## 7.7 Consistency for standards that provide input data and boundary conditions

Standards that provide input data or the procedures on boundary conditions for the assessment of the energy performance of buildings (segment 7 of the pyramid shown in figure 3.1) need to provide information that is consistent and useable for the higher levels in the pyramid.

**Recommended actions:**

- These standards need to be identified as such (existing ISO or CEN standards and work items, need for new ISO work items)
- It has to be checked if the output fits as input for the energy performance assessment:
  - The output variables should be (made) consistent with respect to common terms, definitions and symbols.
  - Type of output needed: Fit for use in annual calculations, monthly calculations, hourly calculations (e.g. parameters determining the efficiency of a combustion boiler; thermal transmission through the ground floor to the ground, total solar energy transmittance of a window with solar shading device, ...).
  - Application range (e.g. types of buildings, new/existing buildings/systems).
  - Fit for use in context of building regulations (unambiguous, practical, …).

On the other hand: To enable the use of the standards in situations with different levels of available details of input data (detailed versus default values), the "segment 7" standards writers need to be informed how big or small the impact of uncertainties or inaccuracies in the component data is on the energy performance of the building. Only then they can offer procedures with options that are the best suited (a) for situations with detailed information, like new building designs, and (b) for situations with little or inaccessible information (e.g. old existing buildings).

## 7.8 Consistency with related areas

Another challenge is to **establish efficient links to related areas**, such as monitoring and inspection of energy performance and commissioning of systems, design of energy efficient buildings, validation of energy calculation methods, environmental impact of buildings and energy management.

Areas of standardization which are closely related to the energy performance of buildings are:

- Presentation of measured energy use of buildings: existing work item of ISO/TC 163/WG 3
- Monitoring and inspection of energy performance: new work items to be identified by AHG of ISO/TC 163
- Commissioning ...
- Design of energy efficient buildings
- Environmental impact…
- Energy management…
- Validation criteria for energy calculation methods (including energy needs and technical building systems)
- More?!

**Recommended actions:** Prepare overview, establish links, prepare proposals to ensure consistency.

## 7.9 CEN-ISO collaboration

The **timing** of periodic revision of the CEN standards (typically 5 years after the publication) coincides well with the intended publication date of ISO standards on energy performance of buildings (typically 2 to 3 years from now), as figure 7.8 shows.

There is also a strong interest of ISO in the subject, which culminated in the recent (June 2009) establishment of a Joint Working Group in ISO to develop ISO (EN ISO) standards on energy performance of buildings, using the EPBD - CEN standards as a basis. This creates a unique opportunity for Europe to retain the lead on the preparation of energy performance standards in a combined CEN-ISO effort.

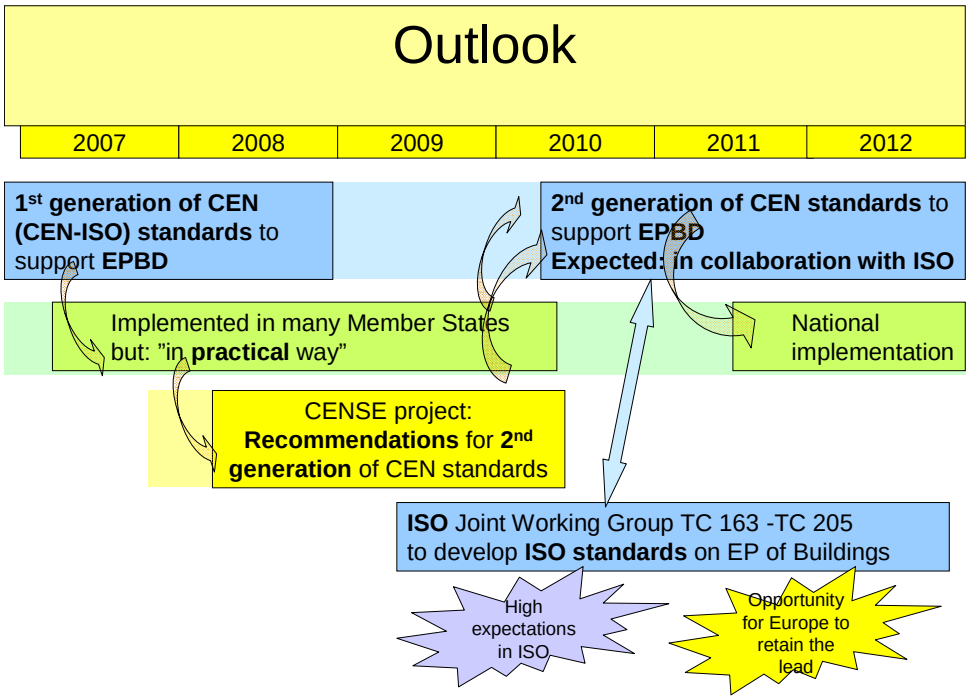



**Fig. 7.8 – CEN, CENSE and ISO timing**

## 7.10 Parallel routes for references to CEN or ISO standards

***Problem:***

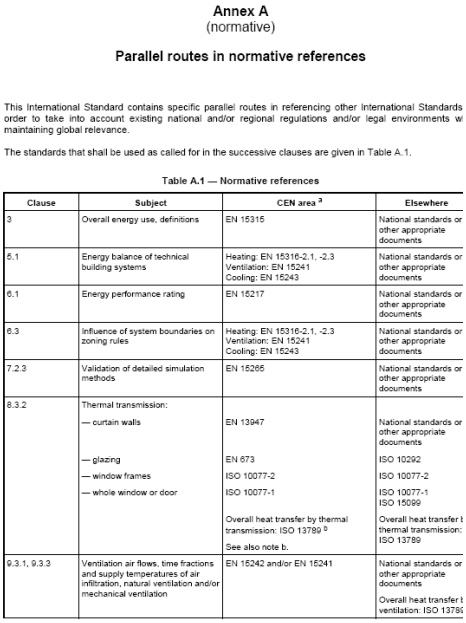
The development of EN ISO standards requires that for use within CEN (to be in compliance with European Directives, such as Construction Product Directive or EPBD) normative references have to be made to CEN standards (if no EN ISO standard exists). But for use elsewhere, references have to be made to ISO or national standards.

***Solution:***

Following extensive consultations within ISO, for EN ISO 13790, one of the key standards on the energy performance of buildings, this problem was solved by concentrating all references to other standards in one normative annex (Annex A) which provides for the "CEN area": references to CEN (EN or EN ISO) standards and for "elsewhere": references to ISO standards or, in absence of ISO standards, to national standards.

Of course, other columns, for other international regions, could be added if applicable. In the working draft standards currently being prepared in the JWG this solution is already adopted.

**Example** from EN ISO 13790:



Annex A
(normative)

Parallel routes in normative references

This International Standard contains specific parallel routes in referencing other International Standards order to take into account existing national and/or regional regulations and/or legal environments wi maintaining global relevance.

The standards that shall be used as called for in the successive clauses are given in Table A.1.

Table A.1 — Normative references

| Clause | Subject | CEN area [a] | Elsewhere |
|---|---|---|---|
| 3 | Overall energy use, definitions | EN 15315 | National standards or other appropriate documents |
| 6.1 | Energy balance of technical building systems | Heating: EN 15316-2.1, -2.3<br>Ventilation: EN 15241<br>Cooling: EN 15243 | National standards or other appropriate documents |
| 6.1 | Energy performance rating | EN 15217 | National standards or other appropriate documents |
| 6.3 | Influence of system boundaries on zoning rules | Heating: EN 15316-2.1, -2.3<br>Ventilation: EN 15241<br>Cooling: EN 15243 | National standards or other appropriate documents |
| 7.2.3 | Validation of detailed simulation methods | EN 15265 | National standards or other appropriate documents |
| 8.3.2 | Thermal transmission:<br>— curtain walls | EN 13947 | National standards or other appropriate documents |
| | — glazing | EN 673 | ISO 10292 |
| | — window frames | ISO 10077-2 | ISO 10077-2 |
| | — whole window or door | ISO 10077-1<br>Overall heat transfer by thermal transmission: ISO 13789 [b]<br>See also note b. | ISO 10077-1<br>ISO 15099<br>Overall heat transfer t thermal transmission: ISO 13789 |
| 9.3.1, 9.3.3 | Ventilation air flows, time fractions and supply temperatures of air infiltration, natural ventilation and/or mechanical ventilation | EN 15242 and/or EN 15241 | National standards or other appropriate documents<br>Overall heat transfer t ventilation: ISO 13789 |

**Fig. 7.9 Example of "Annex A" for parallel routes in normative references**

## 7.11 Technical recommendations for specific (subsets of) standards

Per cluster of standards on a specific subject technical recommendations have been prepared by the CENSE teams who focused on a specific subset of the CEN-EPBD standards. These recommendations are based on a combination of questionnaires and specific workshop sessions.

These technical recommendations can be found in the following reports ([8]-[13]):

CENSE WP2.3 N03, Report on the application of two key standards for the EPBD: EN 15603 (Overall energy use and definition of ratings) and EN 15217 (Methods for expressing energy performance and for energy certification of buildings), Kees Arkesteijn en Dick van Dijk, May 2010

CENSE WP3.3 N02, Report on the application of CEN Standard EN 15193; EN 15193: Energy Performance of Buildings - Energy Requirements for Lighting, Anna Staudt, Jan de Boer and Hans Erhorn, January 2010

CENSE WP3.3 N03, Report on the application of CEN-standard EN ISO 13790: Energy performance of buildings – Calculation of energy use for space heating and cooling, Anna Staudt, Hans Erhorn and Dick van Dijk, May 2010

CENSE WP3.3 N04, Report on the application of the series of EN ISO standards on thermal transmission properties of building components and building envelope. EN ISO 6946, 10077, 10211, 10456, 13370, 13786, 13789, 14683; EN 13947, Dick van Dijk, Anna Staudt and Hans Erhorn, May 2010

CENSE WP4.3 N01, Enquiry Analysis of the CEN-standards on Heating Systems and Domestic Hot water. Recommendations, Johann Zirngibl and Claude François, March 2010

CENSE WP5.3 N01, Enquiry Analysis of the CEN-standards on Ventilation and Air Conditioning. Recommendations, Hicham Lahmidi, May 2010

# 8 Timing and organization

## 8.1 Introduction

As in the previous chapter, the following paragraphs give only suggestions, and are not intended in whatever way to interfere in the discussion and decisions of CEN and/or ISO, where also other considerations may play an important role.

## 8.2 Synchronized approach

To ensure consistency and to enable to comment on drafts, including the interactions, the development of international standards on the energy performance of buildings should preferably be developed in a synchronised way: The group of interrelated European and/or International standards can be synchronized by aligning their development and publication stages.

> NOTE The concept of 'package' applies in CEN but not in ISO, being tied to a group of standards having the same date of withdrawal (of existing national standards on the same topic), because CEN members are bound to adopt the European Standard and to withdraw any national standard in conflict or overlapping. ISO members are not bound to adopt International standards.

**Recommended action**: Add tentative time schedules.

## 8.3 Communication plan

It is an important job to send clear messages on the work being done and the timeline (“master plan”):

- For policy makers
- For related CEN and ISO initiatives
- For CEN: aim: next generation of CEN-(ISO)-EPBD standards? = all EN ISO standards?
- For national standard writers: they must know when and what they can expect from ISO (EN ISO), to be able to anticipate when they are preparing (revisions of) the national procedures/building regulations

# 9 The need of positive signals towards a European common methodology

Various target groups underline the benefits of a Europe wide unified framework (knowledge share, avoid of duplications of efforts, fair competition, more transparency and better chances for innovation).

The first EPBD – CEN package has in general already a good quality compared to national methods. The quality and usability would be increased by the second generation.

But how to get the Member States to make the switch from their national method, in which also a lot of effort has been invested (e.g. training of the professionals) to the European method, especially on a short notice?

To bring the EPBD – CEN package to application there are several options:

- Wait until the national methods are voluntarily replaced by the European methods;
- Make the application of the EPBD – CEN package mandatory;
- Give the market forces the possibility to do it.

The first option will probably take a lot of time, because the driving forces are national, with a stronger national interest than a European one.

The second option is strongly supported by target groups working on the European level, because the national methods raise new barriers for the free circulation of products and services in Europe. For several reasons, there are hesitations from the side of the Commission to enforce a 100% mandatory application.

The third option, using the market forces, could lead to a soft convergence of national methods and the European one. In this option, a methodology, based on the EPBD - CEN package, should be admitted in parallel to the national method, to fulfil the national building codes requirements. The justification would be that national monopolistic positions for methodologies and software are not compatible with the objective of a European market. At the same time it would stimulate countries to write National Annexes or National Application Documents if and where they fear that the parallel routes would lead to different results.

A neater and better organized second generation of CEN standards is a necessary condition to make this a feasible option in practice; although in some Member States the use of the EPBD – CEN package as an option to fulfil the national building codes requirements (without further national specification) is already authorised.

A contribution to the perspective of EU-wide application of the EPBD-CEN standards, is the expectation that the comparative methodology framework to identify cost-optimal levels of energy performance requirements for buildings and building elements, an important element in the EPBD recast, should be based on European standards (recast annex III. It will be very constructive to benchmark the national methods by the unified European methodology, to analyse the differences and to update the methods by the best practice. The CENSE partners are looking forward to discuss with DG ENER how to avoid that the development of the common method for cost-optimum calculations and the preparation of the second generation of CEN standards will diverge and miss the opportunity of synergy. In this respect we should learn from the lack of compatibility in the procedures developed under the EuPD with the EPBD - CEN package.

## 10 You and CENSE

Do you think the CEN standards are not useable?

> *We show examples of successful application: many MS already apply many parts of the CEN standards*
> *(but often "in a practical way") (see website)*

Do you think the CEN standards are not reliable?

> *We made an effort to explain that they are (see website)*

If you think the CEN standards are too fragmented, or too many, or ..?

> *Let us show you that and how the general concept can be used, to start with… (see website)*

If you think that the CEN standards are not good enough?

***Based on your feed back we prepared recommendations to CEN for the 2nd generation of EP standards***

***Aiming at more direct use of the standards, instead of only practical application***

Visit our website: www.iee-cense.eu for more information.

## 11 References

[1] CENSE WP6.1 N03, Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD), April 29*), 2009.

[2] CENSE WP6.1 N03A, Annexes to report Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD), April 29*), 2009.

[3] CENSE BOOKLET 1, Compilation of Information Papers introducing the CEN standards concerning Overall Energy Performance of Buildings, April 2010

[4] CENSE BOOKLET 3, Compilation of Information Papers introducing the CEN standards concerning Building Energy Performance, April 2010

[5] CENSE BOOKLET 3, Compilation of Information Papers introducing the CEN standards concerning Heating Systems and Domestic Hot Water, April 2010

[6] CENSE BOOKLET 4, Compilation of Information Papers introducing the CEN standards concerning Ventilation and Cooling Systems, April 2010

[7] CENSE BOOKLET 5, Compilation of Information Papers introducing the CEN standards concerning Inspection of Systems for Heating, Air conditioning and Ventilation, April 2010

[8] CENSE WP2.3 N03, Report on the application of two key standards for the EPBD: EN 15603 (Overall energy use and definition of ratings) and EN 15217 (Methods for expressing energy performance and for energy certification of buildings), Kees Arkesteijn en Dick van Dijk, May 2010

[9] CENSE WP3.3 N02, Report on the application of CEN Standard EN 15193; EN 15193: Energy Performance of Buildings - Energy Requirements for Lighting, Anna Staudt, Jan de Boer and Hans Erhorn, January 2010

[10] CENSE WP3.3 N03, Report on the application of CEN-standard EN ISO 13790: Energy performance of buildings – Calculation of energy use for space heating and cooling, Anna Staudt, Hans Erhorn and Dick van Dijk, May 2010

[11] CENSE WP3.3 N04, Report on the application of the series of EN ISO standards on thermal transmission properties of building components and building envelope. EN ISO 6946, 10077, 10211, 10456, 13370, 13786, 13789, 14683; EN 13947, Dick van Dijk, Anna Staudt and Hans Erhorn, May 2010

[12] CENSE WP4.3 N01, Enquiry Analysis of the CEN-standards on Heating Systems and Domestic Hot water. Recommendations, Johann Zirngibl and Claude François, March 2010

[13] CENSE WP5.3 N01, Enquiry Analysis of the CEN-standards on Ventilation and Air Conditioning. Recommendations, Hicham Lahmidi, May 2010

See also the website for more documentation (Information Papers and reports) and presentations.

CENSE partners:

TNO (NL; coordinator), CSTB (FR), ISSO (NL), Fraunhofer-IBP (DE), DTU (DK), Camco (ESD) (UK), FAMBSI (FI), EDC (IT)

Associated partners:

HTA Luzern (CH), BRE (GB), Viessmann (DE), Roulet (CH), JRC IES (EC)

Link: *www.iee-cense.eu*

Original text language: English

Disclaimer: CENSE has received funding from the Community's Intelligent Energy Europe programme under the contract EIE/07/069/SI2.466698.

# Annex A– Suggestions for a common structure

A first draft will be prepared for discussion as a separate working document

# Annex B – Example of National Annex under new common structure

A first draft will be published for discussion as a separate working document

# Annex C– Summary of background and status of the CEN-EPBD standards

## C.1 The CENSE project

The aim of the CENSE project (2007-2010) is to support the EU Member States (MS) and other target groups in achieving better awareness and more effective use of the European (CEN) standards that are related to the Energy Performance of Buildings Directive (EPBD).

These standards were successively published in the years 2007-2008 and are currently either already being implemented or will soon be implemented in many EU Member States. Sometimes “as is”, but more often “in a practical way”.

The main activities in the project are:

1) to communicate the role, status and content of these standards as widely as possible, and to provide guidance on their implementation;
2) to collect comments and examples of good practice from the MS, so as to remove obstacles to implementation, and to collect and secure results from relevant SAVE and FP6 projects;
3) to prepare recommendations to CEN.

More information on the project is given in Annex D.

More information on the project can also be found in the Information Paper P86, *The CENSE project. Leading the CEN Standards on Energy performance of buildings to practice. A project (2007-2010) under the Intelligent Energy Europe programme*.

This is one of a series of Information Papers that can be downloaded from the website (www.iee-cense.eu).

## C.2 The Energy Performance of Buildings Directive (EPBD)

The Directive 2002/91/EC (EPBD, 2003) of the European Parliament and Council on energy efficiency of buildings ("Energy Performance of Buildings Directive", EPBD) was adopted on 16th December 2002 and came into force on 4th January 2003.

This Energy Performance of Buildings Directive (EPBD) is considered a very important legislative component of energy efficiency activities of the European Union.

The Directive is set to promote the improvement of energy performance of buildings with the following requirements to be implemented by the Member States:

— the general framework for a methodology of calculation of the integrated energy performance of buildings;

— the application of minimum requirements on the energy performance of new buildings;

— the application of minimum requirements on the energy performance of large existing buildings that are subject to major renovation;

— energy performance certification of buildings;

— regular inspection of boilers and of air-conditioning systems in buildings and in addition an assessment of the heating installation in which the boilers are more than 15 years old;

— requirements for experts and inspectors for the certification of buildings, the drafting of the accompanying recommendations and the inspection of boilers and air-conditioning systems.

Within these general principles and objectives, it is the individual responsibility of each EU Member State to choose measures that corresponds best to its particular situation (subsidiarity principle). However, it is clear that collaboration and information exchange can highly facilitate the implementation.

**EPBD recast**

The 2010 recast of the Directive on the Energy Performance of Buildings (EPBD) intends to strengthen the effectiveness and impact of the EPBD. The Buildings Platform Information Paper P149 provides more information on the possible impact on the calculation procedures, based on the Nov. 2008 recast proposal.

More information: www.buildingsplatform.eu (from early May 2009: www.buildup.eu)

## C.3 Mandate to CEN for European standards to support the EPBD

The European Commission, DG TREN and DG Enterprise, gave Mandate 343 to CEN (2004). It ordered CEN to develop a methodology for calculating the integrated energy performance of buildings in accordance with the terms set forth in Directive 2002/91/EC (Energy Performance of Buildings Directive-EPBD).

Access to this methodology in the form of European Standards makes it possible to coordinate the various measures for improving the energy efficiency in buildings that are used in the Member States. It will increase the accessibility, transparency and objectivity of energy performance assessment in the Member States (as mentioned in recital (10) of the EPBD).

## C.4 Status and role of the CEN standards

The CEN standards to support the EPBD were successively published in the years 2007-2008 (see C.6).

The role of the EPBD-CEN standards is to provide a common European concept and common methods for preparing energy performance certification and energy inspections of buildings.

However, the implementation of these CEN standards in the EU Member States (MS) is far from trivial: the standards cover a wide variety of levels and a wide range of interlaced topics from different areas of expertise. They comprise different levels of complexity and allow differentiation and national choices at various levels for different applications.

The commission supported the development of the CEN standard by giving a mandate to CEN to produce the standards needed to support the implementation of the EPBD. It will be beneficial for Europe if all Member States use these standards as reference. However building regulation is an area where the EU Member States claim their national privilege to formulate the national legislation (also the EPBD adopted the subsidiarity principle in this respect).

Regional differences in climate, building tradition, legal settings, quality assurance and user behaviour in Europe will have impact on the input data and consequently on the energy performance. These differences will also lead to different choices when it comes to finding the optimum balance between accuracy and simplicity. The standards developed under the EPBD have to be flexible enough to accommodate these differences.

Consequently, although most MS say they use the CEN standards as a basis, as these procedures are in accordance with the EPBD, most of the Member States do not require the direct use of these standards.

The standards are worked out in such a way that direct practical use, without supporting national information (national annexes), may be difficult. In some MS part of the content will be found in national publications or regulations, in some other MS using the EPBD standards is always an alternative accepted solution.

On the long term, harmonisation of the standards will also be attractive for all Member States. The maintenance and further development costs will be lower compared with the situation where all MS have to do this on their own. In addition, there is great advantage in having harmonised standards throughout Europe. The wide scale implementation of new technical solutions, equipment and systems will become easier if the performance is calculated in a similar way. This means that the industry may have a bigger market throughout Europe which may also benefit their opportunities on the world market.

The CENSE project organizes the information on the CEN standards and the feed back from the Member States, to prepare recommendations to CEN for the next generation of CEN (and/or CEN-ISO) standards on the energy performance of buildings.

More on the status and role of the CEN standards is given in **Annex B in [2]**.

## C.5 The global perspective: ISO

Practical tools in the form of standards are also needed at global level. Consequently, there are also initiatives in ISO on standardization of energy performance of buildings. Some of the developed and/or updated EPBD CEN standards have already been voted in parallel. This means that these standards are CEN standards and ISO standards at the same time. This includes EN ISO 13790 as well as the series of standards dealing with thermal transmission properties. This work is done in parallel in ISO Technical Committee TC 163, "*Thermal performance and energy use in the built environment*". Also other ISO Technical Committees are preparing draft standards that are related to the energy performance of buildings, e.g. in ISO/TC 205, "Building environment design".

It is expected that more of the current EPBD CEN standards may be adopted by ISO/TC 163 and/or ISO/TC205 as well. This means that the current EN's may become EN ISO standards. This could be done without changing the technical content of the current EN's.

Global consensus on such methods provides transparency for all interested parties. It enables meaningful comparisons of actual energy use and the potential of energy saving and renewable energy technologies at a global level. This is essential for international cooperation to solve the environmental and climate change problems.

The ISO standards are widely accepted and may even increase the market opportunities of the European industry.

## C.6 Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD)

A separate CENSE report has been published with both summarized and detailed information on the background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD):

[1] CENSE WP6.1 N03[*)], *Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD)*, April 29[*)], 2009.

[2] CENSE WP6.1 N03A*), Annexes to report *Background, status and future of the CEN standards to support the Energy Performance of Buildings Directive (EPBD)*, April 29*), 2009.

*): or more recent revised version

The next section shows the different elements involved in the assessment of the overall energy performance of a building, including the technical building systems. This comprises a number of successive steps, which can be schematically visualized as a pyramid.

## C.7 The holistic approach: think "Pyramids"

The assessment of the overall energy performance of a building, including the technical building systems, comprises a number of successive steps, which can be schematically visualized as a pyramid.

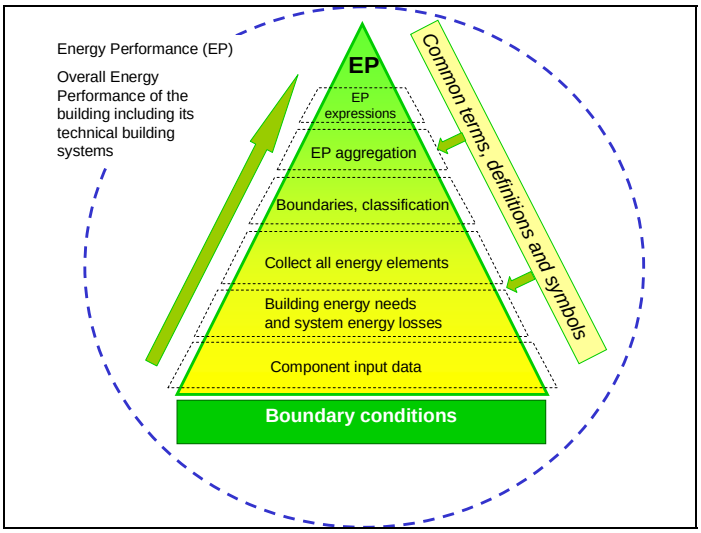



**Fig. C.1 - Overall building energy performance**

Sets of **common terms, definitions and symbols** are essential for all segments from top to bottom. These cover terms such as energy needs, technical building systems, auxiliary energy use, recoverable system losses, primary energy and renewable energy.


**Fig. C.2 – Harmonization of terms is essential**

**The top segment** of the pyramid is the main output: the energy performance and the energy performance certificate of the building.

**The second segment** provides the inputs for the top segment: one or more numerical indicators expressing the energy performance (such as overall energy use per square metre conditioned floor area, EP), a classification and ways to express the minimum energy performance requirements ($EP_{max}$).

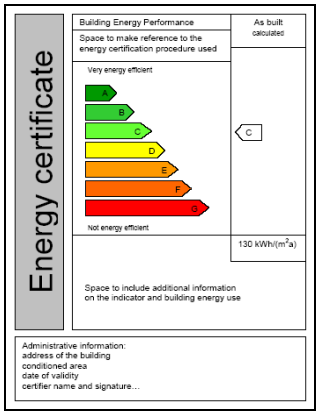



**Fig. C.3 – Example of energy performance certificate**

**The third segment** describes the principles and procedures on the weighting of different energy carriers (such as electricity, gas, oil or wood) when they are aggregated to overall amount of delivered (and exported) energy. For instance, this may be expressed as total primary energy ($E_P$) or carbon dioxide emission ($E_{CO2}$).

**The fourth segment** specifies the categorization of building types (for example, office spaces, residential or retail) and specification of the boundaries of the building.

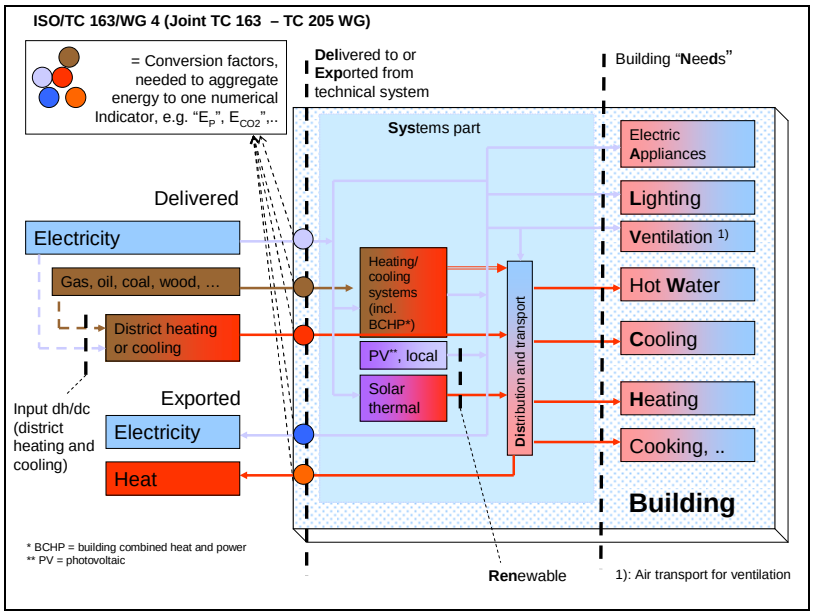



**Fig. C.4 –Boundaries and main building energy performance elements**

**The fifth segment** provides procedures on the breakdown of the building energy needs and system energy losses, aiming at gaining clear insights into where energy is used.

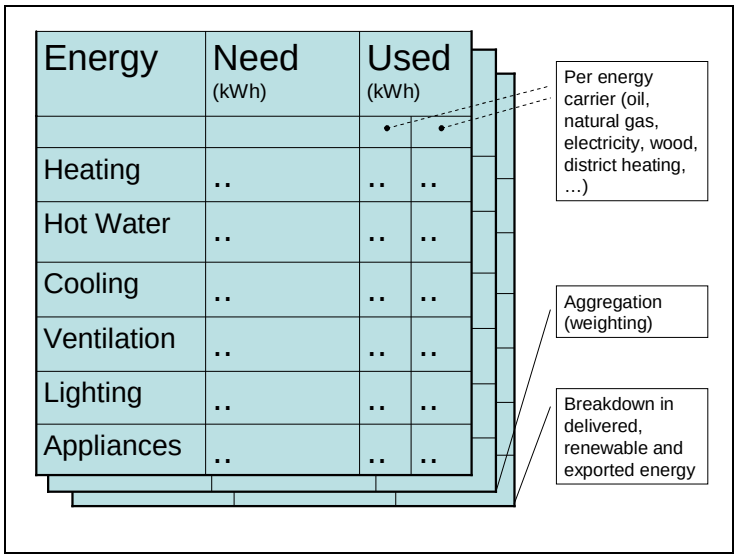



**Fig. C.5 – Procedures for a consistent breakdown of energy elements**

**The sixth segment** provides the building energy needs and energy use for each application (heating, cooling, etc.) and interactions between them.

**The seventh segment** provides the input data on components, such as thermal transmission properties, air infiltration, solar properties of windows, energy performance of system components and efficiency of lighting.

The standards on **boundary conditions** comprise external climatic conditions, indoor environment conditions (thermal and visual comfort, indoor air quality, etc.), standard operating assumptions (occupation) and national legal restrictions.

# Annex D – CENSE project summary

**Acronym**

CENSE

**Title**

IEE-CENSE. Leading the CEN Standards on Energy performance of buildings to practice.
Towards effective support of the EPBD implementation and acceleration in the EU Member States

**Objective**

To accelerate the adoption and improved effectiveness of EPBD-related building energy performance standards in EU Member States

**Benefits**

Increased accessibility, efficiency and harmonisation of building energy performance assessments in the MS

**Main activities**

— To communicate the role, status and content of these standards as widely as possible and to provide guidance on their implementation.

— To collect comments and examples of good practice from MS, so as to remove obstacles to implementation, and to collect and secure results from relevant SAVE and FP6 projects.

— To prepare recommendations to CEN.

**Duration**

The project duration is from October 2007 until March 2010.

**Partners**

The partners in the project (from eight different countries) are all experts who are active in CEN-EPBD. They combine this expertise with knowledge and experience of implementation at the national level.

**Partners:**

| Organisation | Country | Persons | Website |
|---|---|---|---|
| TNO (coordinator) | The Netherlands | Berrie van Kampen (Operational management)<br>Dick van Dijk (Project coordination)<br>Hans van Wolferen<br>Marleen Spiekman | www.tno.nl |
| CSTB | France | Johann Zirngibl<br>Jean Robert Millet<br>Hicham Lahmidi<br>Claude Francois | www.cstb.fr |
| ISSO | The Netherlands | Jaap Hogeling<br>Kees Arkesteijn | www.isso.nl |
| Fraunhofer - IBP | Germany | Hans Erhorn<br>Anna Staudt<br>Jan de Boer | www.ibp.fraunhofer.de |
| DTU | Denmark | Bjarne Olesen<br>Peter Strøm-Tejsen | www.ie.dtu.dk |
| Camco (formerly ESD) | United Kingdom | Robert Cohen | www.camcoglobal.com |
| FAMBSI | Finland | Jorma Railio | www.fambsi.fi |
| EDC | Italy | Laurent Socal | www.edilclima.it |

**Associated partners:**

| Organisation | Country | Persons | Website |
|---|---|---|---|
| HTA Luzern | Switzerland | Gerhard Zweifel | www.hslu.ch |
| BRE | United Kingdom | Roger Hitchin<br>Brian Anderson | www.bre.co.uk |
| Viessmann | Germany | Jürgen Schilling | www.viessmann.de |
| Roulet | Switzerland | Claude-Alain Roulet | www.epfl.ch |
| JRC (IES) | Eur.Commission | Hans Bloem | ies.jrc.ec.europa.eu |

**Expected results**

— A website with guidance documents for the CEN standards.

— Common trends, obstacles identified, possible solutions and examples of good practice concerning the use of the CEN standards.

— Recommendations for further harmonisation.

The project reports, presentations and discussions with target groups will result in increased awareness and knowledge on the content and the usefulness of these European standards and to shared experiences between the Member States (building code and standard writers) and other major target groups (design engineers and installation engineers, manufacturers).

**CENSE Information Papers in cooperation with the EPBD Buildings Platform**

One of the most effective ways to disseminate information on the CEN standards, which also serves to trigger feedback from the target groups, is by so-called Information Papers.

As a result of cooperation with the EPBD Buildings Platform, these Information Papers are based on the general template for Buildings Platform Information Papers and are made available at the Buildings Platform website, along with other Information Papers related to the EPBD.
From summer 2009 the Buildings Platform has been succeeded by: **www.buildup.eu**.

Examples of information papers from the CENSE project: