

**How to improve the use of CEN standards in the
implementation of EPBD?**
***Calculation of the energy performance of heating,
ventilation and cooling systems***

**CEN, CENSE, REHVA workshop
22nd of March 2010 / Brussels**

Johann ZIRNGIBL
johann.zirngibl@cstb.fr

Centre Scientifique et Technique du Bâtiment, France

Content of the presentation

- **Importance of technical building systems:**
 - in the overall performance of the buildings
 - in building regulations and EPBD
- **Results CENSE project:**
 - Information package on EPBD-CEN standards
 - Feedback from enquiries and workshops
 - Recommendations to CEN
- **Synthesis (final comments)**



Energy flow

➤ Building needs

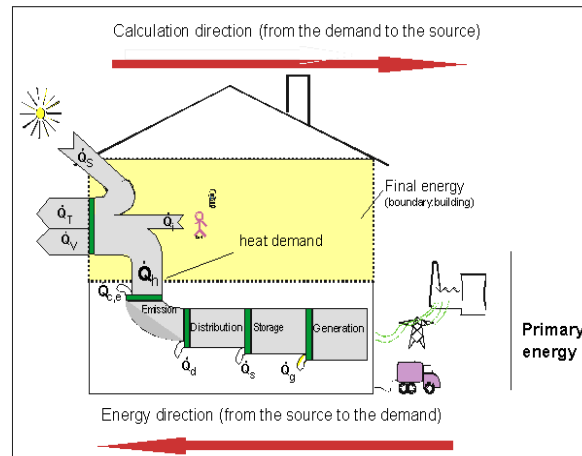
heating
cooling
ventilation
hot water
lighting

➤ Technical equipments

heating
cooling
ventilation
hot water
lighting

➤ Type of energy

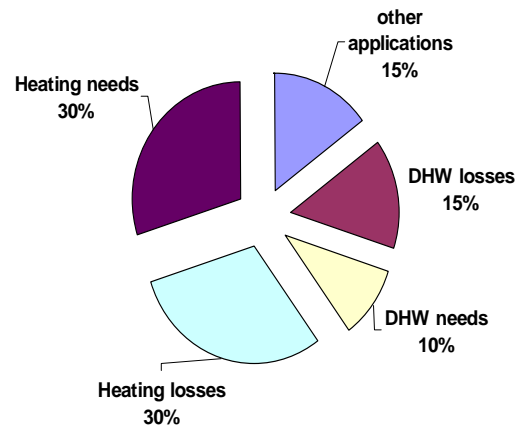
gas, oil, wood, etc.



Various possibilities to improve the energy performance

None should be neglected in a “simplified” approach

Interactions (syst. app.) have to be considered (low energy houses)



Typical breakdown of energy applications in residential buildings (final energy ~ 200 kWh/m² a)

Technical buildings systems and building regulations

Past:

Traditionally building regulations are focussing on **building envelope**
Technical building systems are treated within “**product**” standards”



With EPBD:

EPBD requires an “**holistic**” approach

EPBD recast requires indicators for **technical building system performance**

EPBD recast pays more attention to **inspection**

EPBD favours renewables, energy producing buildings

Technical building systems have to be considered in the holistic approach

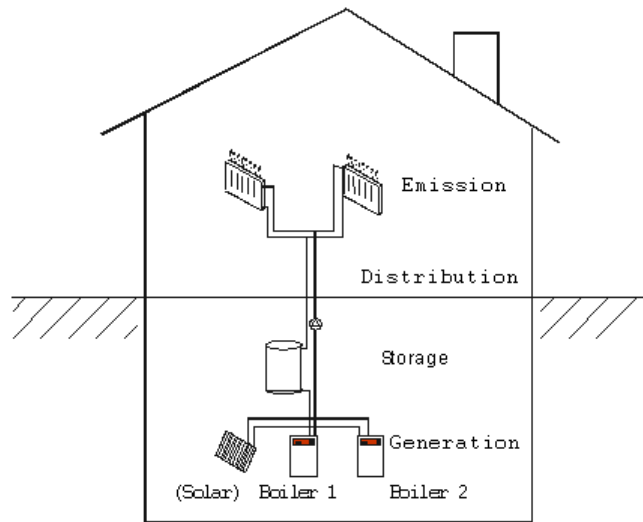
Reliable calculation tools are needed:

- to predict with a (**reasonable?**) **accuracy** the performances of buildings
- to provide **recommendations** for improvements

CENSE project: Information on the EPBD-CEN package – the “system” approach (running conditions, interactions)-

Energy supply (heating systems)

Installation based structure



- Including control

Needs

EN 15316-3.1 DHW needs

Emission*

EN 15316-2.1 Space heating

Distribution*

EN 15316-2.3 Space heating
EN 15316-3.2 DHW

Storage +
Generation*

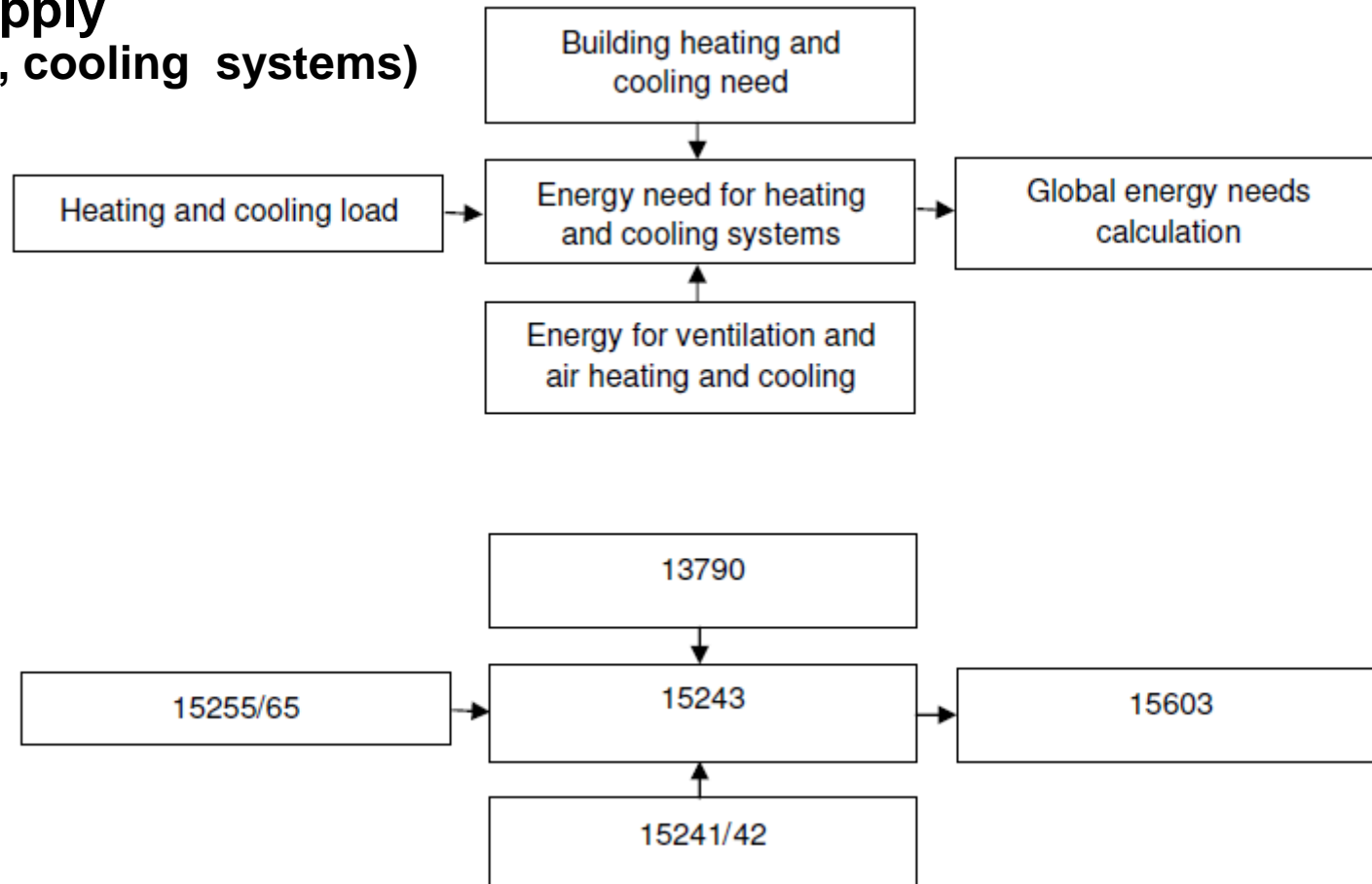
EN 15316-4.1 Combustion (Boiler)
EN 15316-4.2 Heat pump
EN 15316-4.3 Thermal solar
EN 15316-4.4 Micro CHP
EN 15316-4.5 District heating
EN 15316-4.6 Photovoltaic
EN 15316-4.7 Biomass boiler

EN 15316-1 General part

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Information on the EPBD-CEN package

Energy supply (ventilation, cooling systems)



Information on the EPBD-CEN package

Inspection

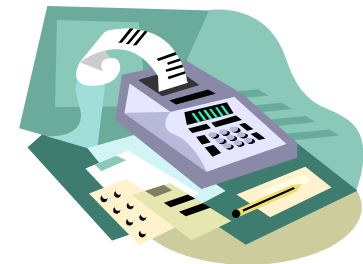
EN 15378
Inspections of boilers
and heating systems



EN 15240
Inspections of air-
conditioning systems

Economic calculation

EN 15459
Economic evaluation procedure for
energy systems



More information

Downloads: www.iee-cense.eu

European projects

P109
12-10-2001

EPBD#14/000

Laurent Social
Edilizia, Italy

Information paper on EN 15378
Heating systems in buildings -
Inspection of boilers and heating
systems

Existing buildings and systems have the most important impact on energy consumption. Identifying the weak points of energy consuming systems (downsizing) and highlighting possible improvements (detailed information) is the first necessary step to improve the energy performance of existing heating systems. This is the main goal of inspection. Standards are useful to define common frame for inspection in order to give advice to the States to fulfil the requirements of article 8 of the EPBD.

The standard EN 15378 contains a well defined basic procedure allowing a high flexibility, too. A lot of practical procedures are given, ready to be assembled according to national inspection classes.

This paper gives a short introduction to CEN standard 15378 on inspection of boilers and heating systems. It contains workload on the inspection procedures and the related calculations (with details on the links with the other CEN standards of the I system series).

The EN standard 15378 successfully passed the formal vote in 2007.

1 > Scope of the standard

This standard has been organized according to the requirements of 8 specified in article 8, option a), which requires two types and levels of heating system inspection:

- A "regular" inspection of boilers;
- A "one-off" inspection of the whole heating system.

Regular inspection: It must be repeated periodically and it needs the owner.

One-off inspection: It is extended to the whole heating system and includes an assessment of boiler efficiency and sizing. It is explicitly intended to the user in order to take the best possible energy performance improvements.

Figure 1: Systems inspection is covered by 7 standards in the IEPD package. Building Paper this has not been considered yet.

www.iee-cense.eu

Energy Performance of Buildings

cense
www.iee-cense.eu

PROJECT DOCUMENT
Status: PUBLIC

Background, status and future of the CEN standards to support the Energy Performance of Buildings (EPB)

Click
TNO Built Environment
Delft, The
Netherlands
Email: dick@iee-cense.eu

CENSE_WP6.1_NO3

IEE-
Leading the CEN Standards on Energy
Towards effective support of the IEPD
in the EU

Energy Performance of Buildings

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Intelligent Energy Europe

Calculation of the integrated energy performance of buildings

EN 15603: Overall energy use
EN 15316 series: the importance of technical building systems

EN 15603: Toplam enerji kullanımı
EN 15316 serisi: Bina teknik sistemlerinin önemi

Johann ZIRNGIBL
Convenor ISO TC 205/WG9, CEN TC 228/WG4
Partner of IEE – CENSE project
Head of development and prospecting CSTB / France
joahann.zirngibl@cstb.fr

Energy Performance of Buildings

cense
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CENSE project: Collect feedback about the EPBD – CEN package

- Enquiries
- Workshops with different target groups
 - building authorities
 - building professionals
 - industrials
 - educational institutes
 - software companies

CENSE Software workshop Brussels, June 2009

Companies could have interest in developing **software for the EU Market**

- to be used within all **national regulatory systems** (e.g. energy performance requirement, energy certificates)
- to be linked to **design tools** (coherence, market)

A software workshop has been organised in Brussels to explore these issues

The subject of the workshop is considered of **high actual priority** (but no **European software still**)

Participants coming from **17 countries** attended the workshop.

The majority of the participants were representing the main European software companies in this field.



slide 10

Linking design, building compliance and information

From system design to energy declaration: **one integrated software**

The screenshot displays the IES software interface. On the left, there are architectural floor plans labeled 'PIANTA PIANO TERRA'. In the center, a 3D model shows the building's energy system components. On the right, a 'Verifiche DPR 59/09' window is open, showing a list of energy performance metrics. Below this window, a small table titled 'Bilanciamento impianto alimentato dal nodo 1' is visible.

Verifica	Ammissibili	Calcolati	Unità
Prestazione energetica per la climatizzazione invernale	79,19	43,12	kWh/(m ² anno)
Prestazione energetica dell'involucro per il raffreddamento	30	26,65	kWh/(m ² anno)
Rendimento globale medio stagionale Eta g	79,36	92,9	%
Rendimento utile - 30 % Pn EtaU	98,45	106,6	%
Rendimento utile - 100 % Pn EtaU	92,45	102,8	%
Rendimento di combustione 100 % Pn EtaC			
Trasmissione media chiusure trasparenti			
Trasmissione media strutture opache			
Verifica massa superficiale e trasmissione periodica			
Rendimento utile - EtaU, riferito all'energia primaria			
Rapporto superficie trasparente / superficie utile			

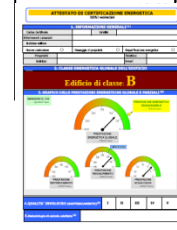
ACQUIRE THE PLANS
(DWG, PDF, BMP...)

SYSTEM DESIGN

COMPLIANCE CHECK

PRINT DOCUMENTS

Design report



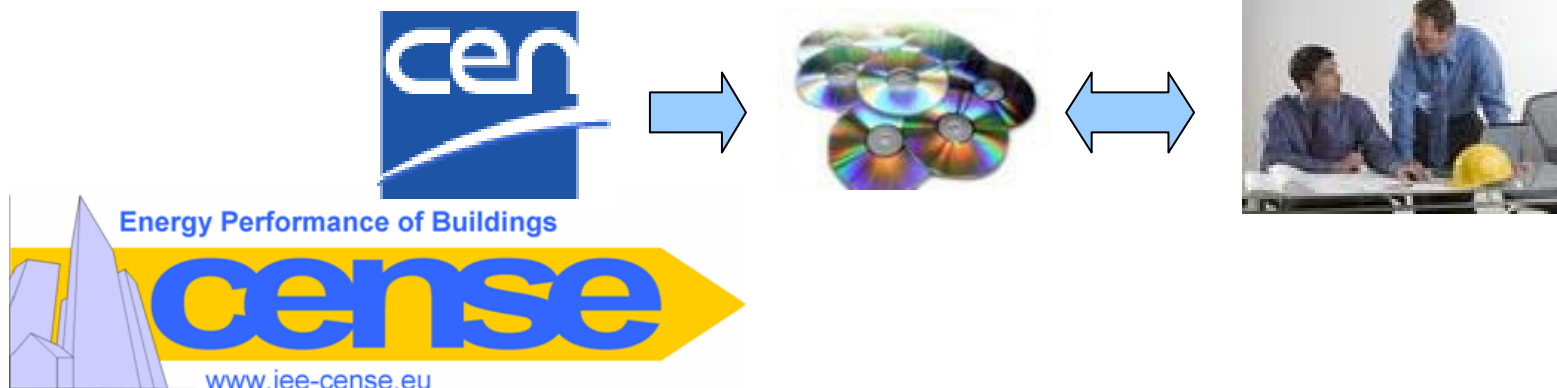
Outcomes on standards, software and regulations

Software developers are the **linking element** between:
standard **writers** and the standard **users** (designers, installers, certifiers)

Mainly the **software developers will read the standards** and apply them in the development of software tools for the building professionals.



- Content of the standards should be "**software proof**" (e.g. no more a text book)
- No **monopole** for public software, commercial software can compete by **higher quality, interoperability** and **service** (hotline, training).
- EU – market** needed,
EPBD-CEN standards should be admitted to **fulfil building codes**
- Linking **design tools** and **building compliance**



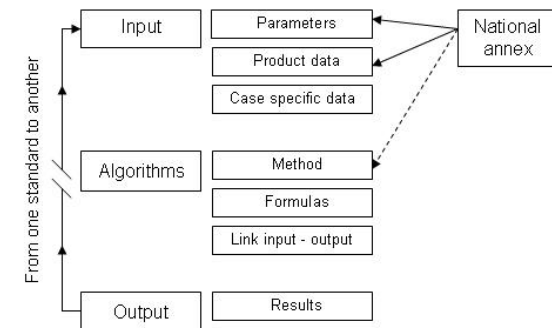
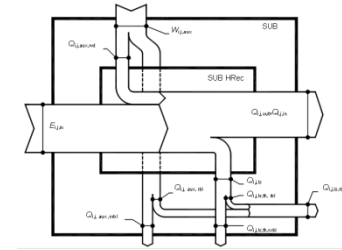
Recommendations to CEN (1)

Identify and remove

- Overlaps (EN 15603, EN 15316-1)
- Gaps (multigenerators)
- Inconsistencies (units, calculations steps)

Improve the structure of the standards

- A clearer, better understandable structure (straightforward step-by-step procedure, flowchart)
- A reduction of options/methods.
- More unambiguous standards.
- Possibility for simplified input (\neq less detailed methods)



Take into account dynamic calculations, based on hourly steps

- Interactions envelope/systems especially in low energy houses
- Performance of modern systems (e.g. heat pumps)

Simplified and/or detailed calculation methods or *inputs!*

EN 15316-1

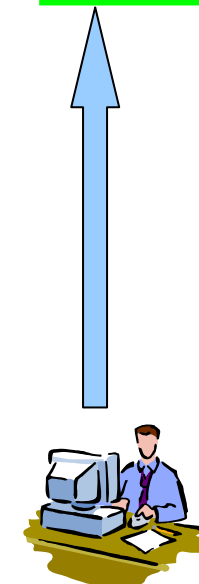
(to be updated with aggregation of inputs)

~~Level A) Losses or efficiencies for the **entire heating system**.
Typology description of the **systems**.~~

Level B) For each sub-system, losses or efficiencies are given
Typology description of the sub-system.

Level C) For each sub-system, losses or efficiencies are calculated.
Calculation is done on the characteristic of the **individual case**.

Level D) Losses or efficiencies are calculated through
dynamic simulations.



Coherence needed

From Level D (detailed) to level A (simplified):

Same defined output values > connection to the general frame (EN 15603)

Recommendations to CEN (2)

New standards and contents

- New standard on operating conditions of generators and multi-generators
- More explicit treatment of air heating systems like air-to-air heat pumps;
- Correction for energy loss due to simultaneous heating and cooling (more interaction heating and cooling standards where necessary)



More links between Inspection and certification

- Develop inspection
- Link the information of inspection to certification



More links between related Directives

- E.g. Energy using product directive (EuP) / Energy performance of building Directive (EPPD)



Synthesis (final comments)

- ✓ **Technical building systems** are sold throughout all Europe and the world → Harmonized market conditions (evaluation methods) are needed
- ✓ **Building profess.** Needs high quality tools to design and realize low energy building throughout all Europe and the world → Integrated tools, linked to unique databases, will be developed only for an important market
- ✓ **Countries outside Europe** will refer only to high quality tools /standards which can be used throughout all Europe and the world → “Simplified” methods can be developed at national level >no need for internat. standardisation

- Urgent need to develop a **harmonized European method** based on standards
- Urgent need to create an **application field** for the European method

2nd mandate for EPBD-CEN standards

- EPBD-CEN stand. **option** on nat. level
- Use the EPBD-CEN standards for **benchmarking** national methods

