



Your service center for information and technical support on the new set of EPB standards

The set of EN and EN ISO EPB standards: supporting the implementation of the EPB Directive in Europe

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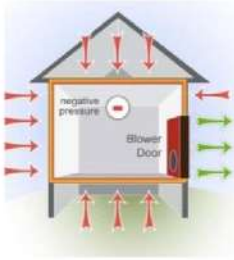
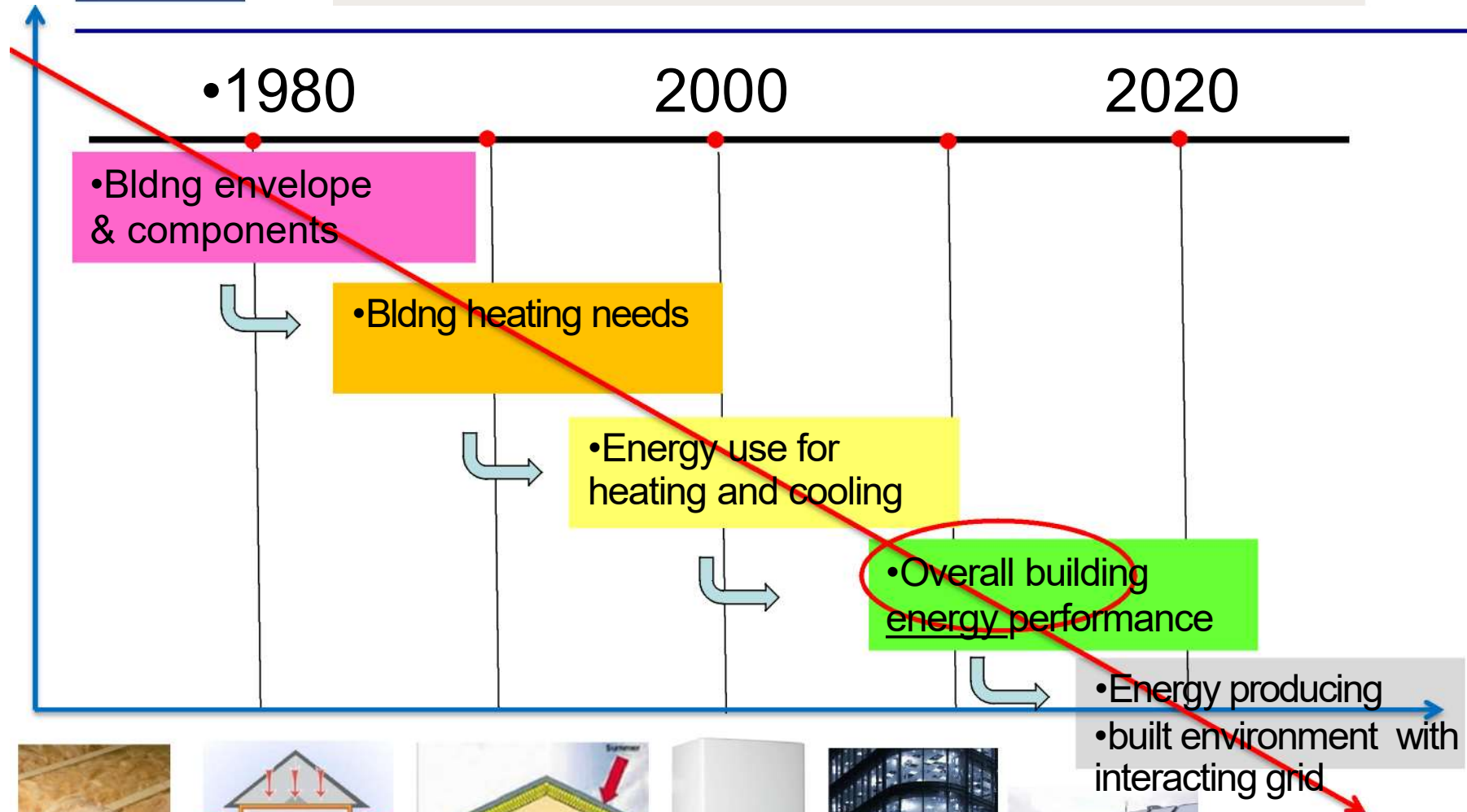
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Start 21 September 2018 for 3 years

**EBC-Annex 71 Symposium The
Building as Cornerstone of our
Future Energy Infrastructure
Bilbao, Spain, 10-11 April 2019**



EPB History





To develop a consistent set of standards to assess overall Energy Performance of Buildings



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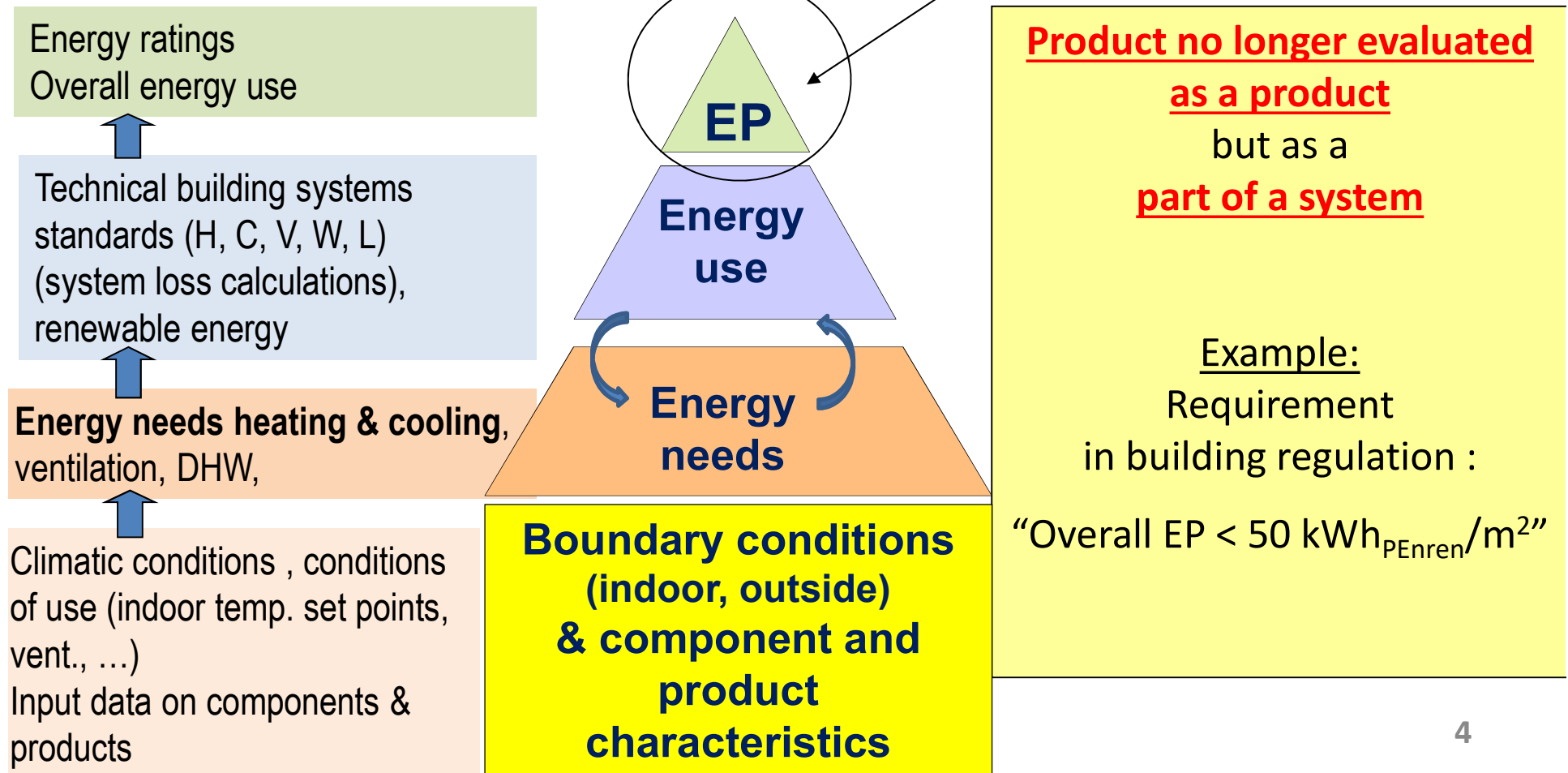


Set of EPB standards: the holistic approach

From *product* standards to *overall* energy use

EN ISO 52000-1

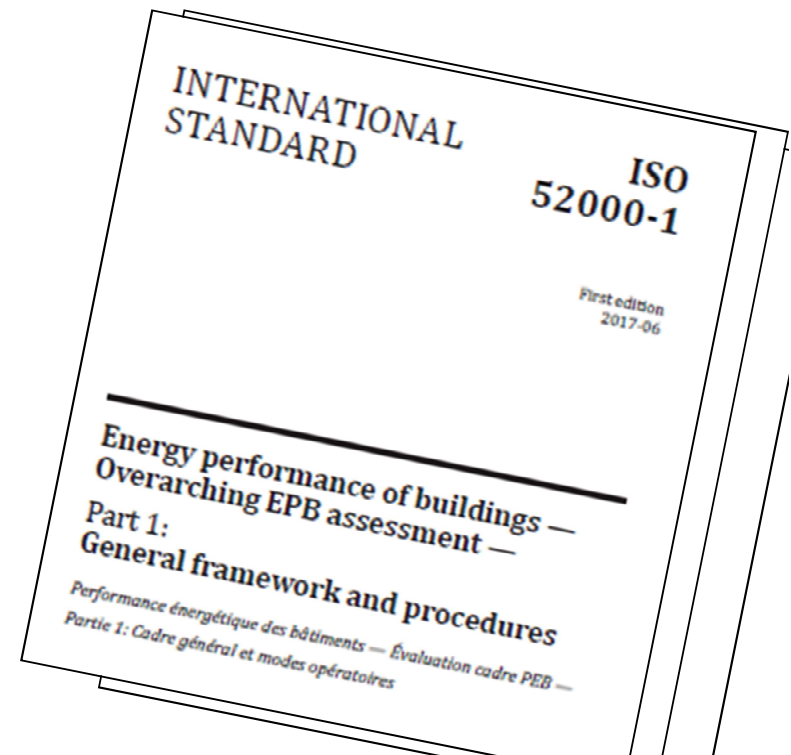
Overarching EPB standard





Set of CEN standards on Energy Performance of Buildings (EPB)

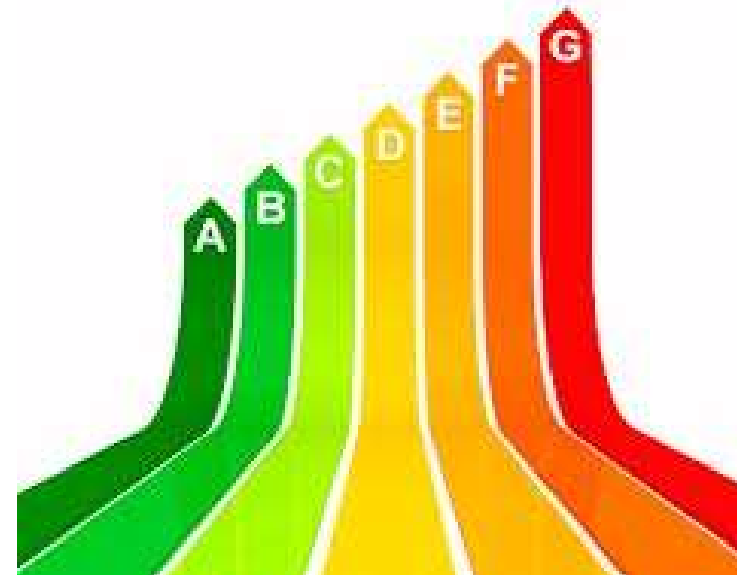
- The SET of 53 standards is based on a holistic (systemic) approach:
- To assess the **integrated impact** on the energy performance of buildings (EPB)
 - Covering e.g. heating, cooling, ventilation, DHW, lighting and the impact of building automation and smart controls,
 - Also covering energy-using and renewable energy producing appliances
 - Respecting the IEQ requirements
- All published in 2017-2018
Full and coherent set of 53 European EPB standards (CEN)
 - and subset (key EPB standards) also already at global level (ISO):
The (EN) ISO 52000 family





Application of the EPB family of standards

- Application:
 - To assess the energy performance of new and existing buildings in a **consistent** way
 - To bring **convergence and transparency** in the EPB assessment methods in Europe and also at global level
- In particular:
 - to check compliance with the minimum energy performance requirements (building codes)
 - as information for the energy performance certificate, and
 - **As basis for the customised advise to renovate the existing building stock**

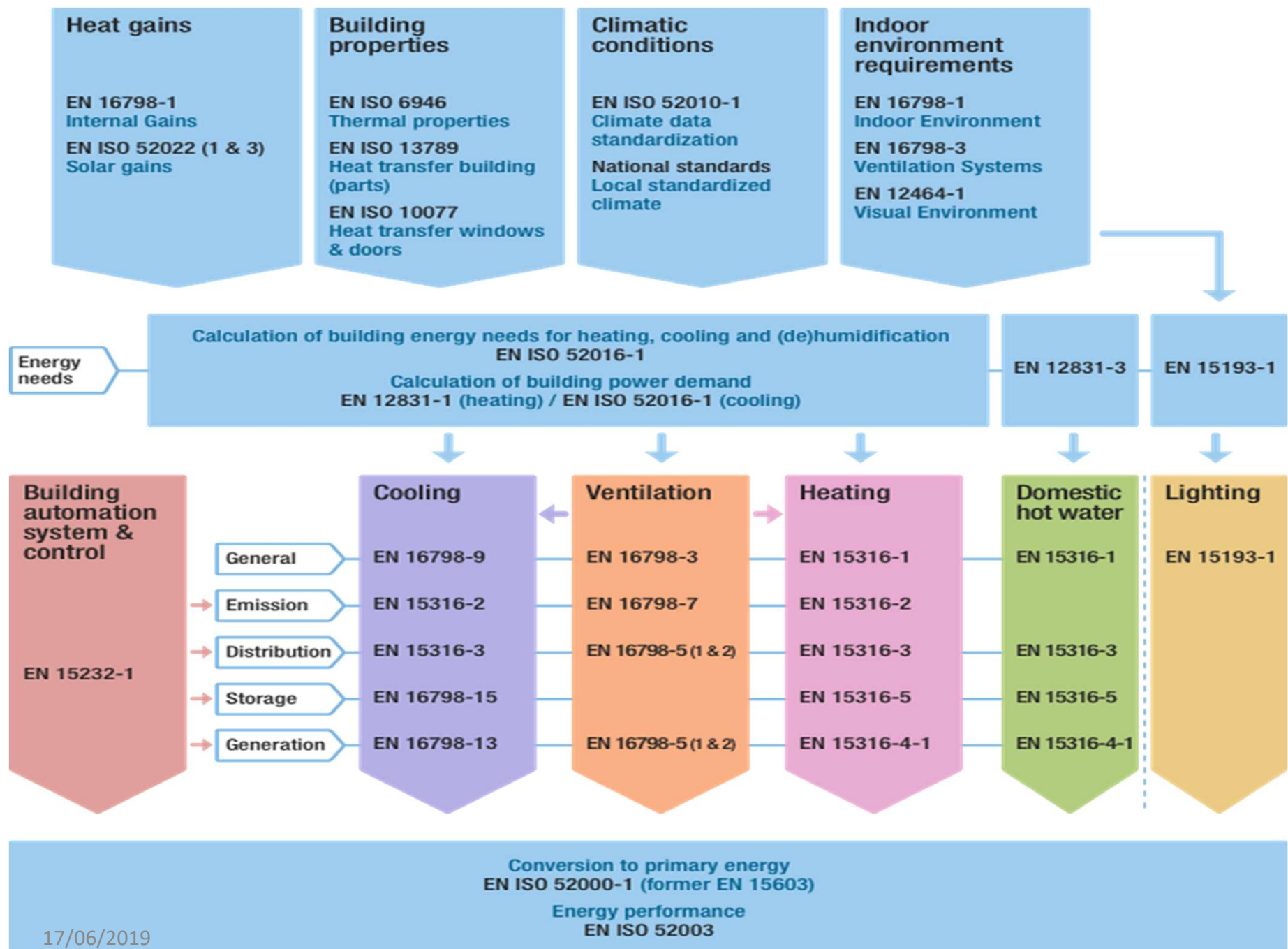




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Supporting material : technical reports

- Each **EPB standard** needs to be as concise and unambiguous as possible
 - fit to be implemented or referenced in national or regional building codes → each EPB standard contains **purely normative procedures** (plus brief (informative) notes)
 - minimal informative annexes
- Each EPB standard (or cluster) is accompanied by an **(informative) technical report**
to properly understand, apply and nationally/regionally implement the EPB standards
 - Explanation
 - Justification
 - Calculation examples



Current status

- The whole set of EPB standards is published
- 17 EPB standards at European (CEN) and global (ISO) level
 - The **ISO 52000** family
 - 36 EPB standards (for the moment..) at European (CEN) level only (ENxxxxxx)
 - 39 accompanying technical reports
- Now: to be implemented in national building regulations
 - Referring to art. 3 of the EPBD: MS's shall apply a methodology for calculating the energy performance of buildings in accordance with the common general framework set out in Annex I.
 - EPBD:2018, Annex I :new obligation for MS's to describe the national calculation methodology following the national annexes of the 5 “overarching” EPB standards

Revised Energy Performance Buildings Directive (EPBD) 2018

- More attention to renovation strategy, MS's shall set out a roadmap and progress indicators:
 - 40% GGE reduction by 2030 (comp 1990) + increase of portion of renewables
 - Mid term goal 2040
 - Long term goal 80-95% GGE reduction by 2050
- Respecting the WHO IAQ guidelines and requirement for thermal comfort
- More attention to Technical Building Systems and their control and automation (BAS required above 290 kW rated output)
- All buildings with an installed capacity above 70 kW require inspection of heating and AC systems, for stand-alone ventilation system this is foreseen as well (ongoing study and query for stakeholders).
- Introduction of the SRI (smart readiness indicator) which is to be defined but is a measure the cap of buildings to interact with the connected energy grid and storage systems , like electric cars(obliged recharging points for new buildings by 2025 etc), optimising the overall EP of the building (ongoing study and stakeholder involvement).

Smart Readiness Indicator (SRI)

New EPBD article advocates the introduction of an **optional common EU scheme** for rating the smart readiness of buildings through a **Smart Readiness Indicator (SRI)**

- Will characterize the ability of a building to manage itself,
- To interact with its occupants,
- And to take part in demand response and contribute to smooth, safe and optimal operation of connected energy assets.

The SRI will be established through two legal acts: delegated act for the **definition and calculation methodology**; implementing act for the technical modalities of **implementation**. By 31 Dec. 2019.

Progress towards 'smarter' building systems can support a more efficient implementation of the EPBD and result in additional benefits for building users, energy consumers and future grids.

Motivation: recognition of progress towards smart building systems and their added value for building users, energy consumers and energy grids.

EPBD Annex 1: Common general framework for calculation of EP of buildings:

- The EP shall be expressed in kWh/(m².y) primary energy use and MS's are encouraged to include the connected GHG emission produced in kgCO₂.eq/m².y
- Methodology shall be transparent and open to innovation.
- MS's shall describe their national procedures following at least the EPB standards: EN ISO 52000-1; 52003-1; 52010-1; 52016-1; 52018-1.

The overarching type ISO EPB standards required by the EPBD (This 52000 series of standards are also accepted at CEN level in Europe)

- EN ISO 52000-1: Overarching EPB assessment —General framework and procedures
- EN ISO 52003-1: Indicators, requirements, ratings and certificates — General aspects and application to the overall energy performance
- EN ISO 52010-1: External climatic conditions —Conversion of climatic data for energy calculations
- EN ISO 52016-1: Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads —Calculation procedures
- EN ISO 52018-1: Indicators for partial EPB requirements related to thermal energy balance and fabric features —Overview of options



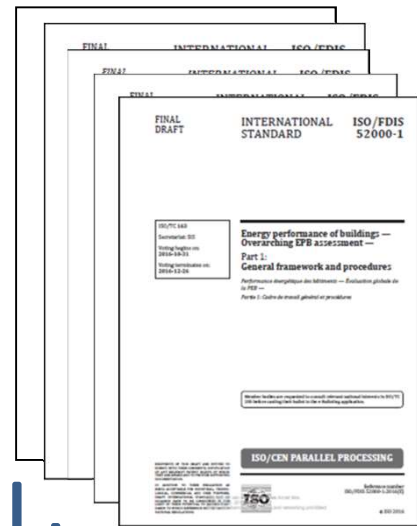
European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung



Each EPB standard contains:

- Annex A (normative): template for choices and input data
- Annex B (informative): informative default choices and input data (could e.g. be used for a voluntary EU certification system)
- In general:
 - Each individual user of the EPB standard is free to create his/her own data sheet according to the template of Annex A
(~ replace the default choices and values of Annex B)

How to implement EPB standards?



Each EPB standard contains an Annex A to be completed at national level:
National Annex (datasheet)
with national choices of options in methods, policy factors and default input data

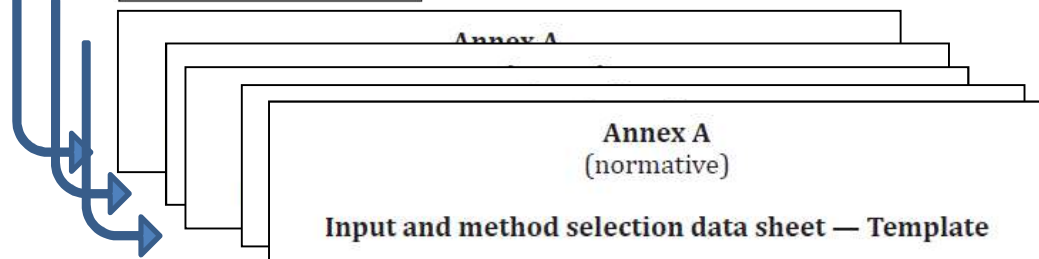


Table A.18 — Building services considered in the energy performance calculation (See 8.2 and 8.5)

Combination of services type	Choice: included in the energy performance calculation List services type, see Table A.10 >	EPB_LIST
Building service a	EPB_LISTSERVICES_RES	
Heating	Yes/No	
Cooling	Yes/No	

Examples of the many choices that can be made in the national datasheets:

A.3 Selection of main method

Table A.2 — Choice between hourly or monthly calculation method (see 5.2)

Type of object and/or application ^b ^b
Description	Choice ^a	Choice ^a
Only hourly method allowed	Yes/No	Yes/No
Only monthly method allowed	Yes/No	Yes/No



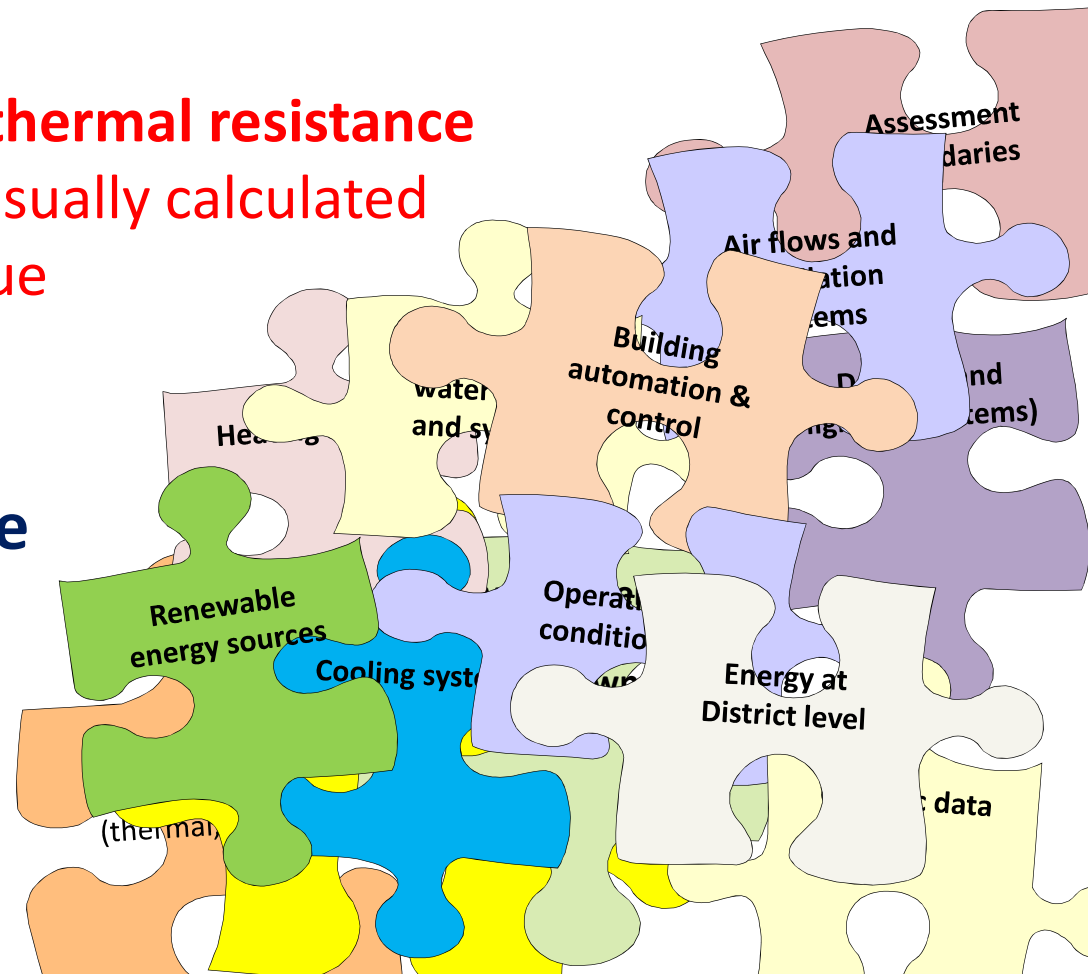
From yearly to hourly calculations

- EN ISO 52000-1, the overarching EPB standard, lists different options for the time interval for the calculation of the overall energy performance:
 - Hourly
 - Monthly
 - Seasonal
 - Yearly
 - Bin



From yearly to hourly calculations

- The choices can be different per element in the calculation:
 - Trivial example: the **thermal resistance** of a construction is usually calculated as a fixed annual value
- On the other hand: in the holistic approach the **system performance** is evaluated as **part of the overall calculation**, taking into account **dynamic interactions**



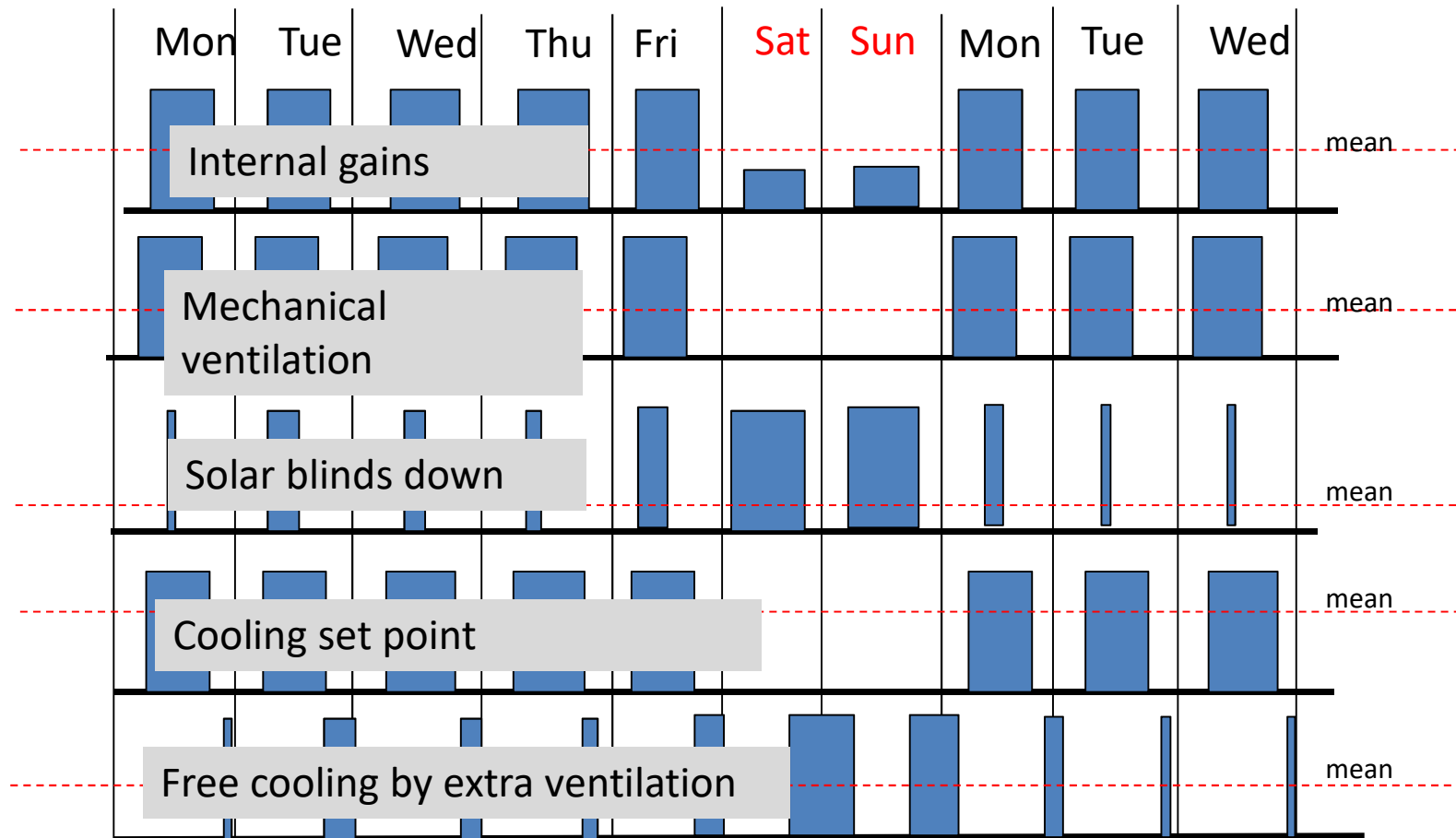


Monthly or hourly calculations

- Many technologies, in particular for low energy buildings: varying in time, with strong and dynamic interactions with hourly and daily variations in weather and operation
 - Solar blinds
 - Occupation
 - Ventilative cooling
 - Temp.settings
 - Accumulation
 - weekend operation
 - Needs
 - Mechan.ventilation
 - etc.
- ➔ strong effect on the heating and cooling calculation
- ➔ Choice between **hourly or monthly** calculation procedures is most prominently visible in the calculation of the **energy needs for heating and cooling**

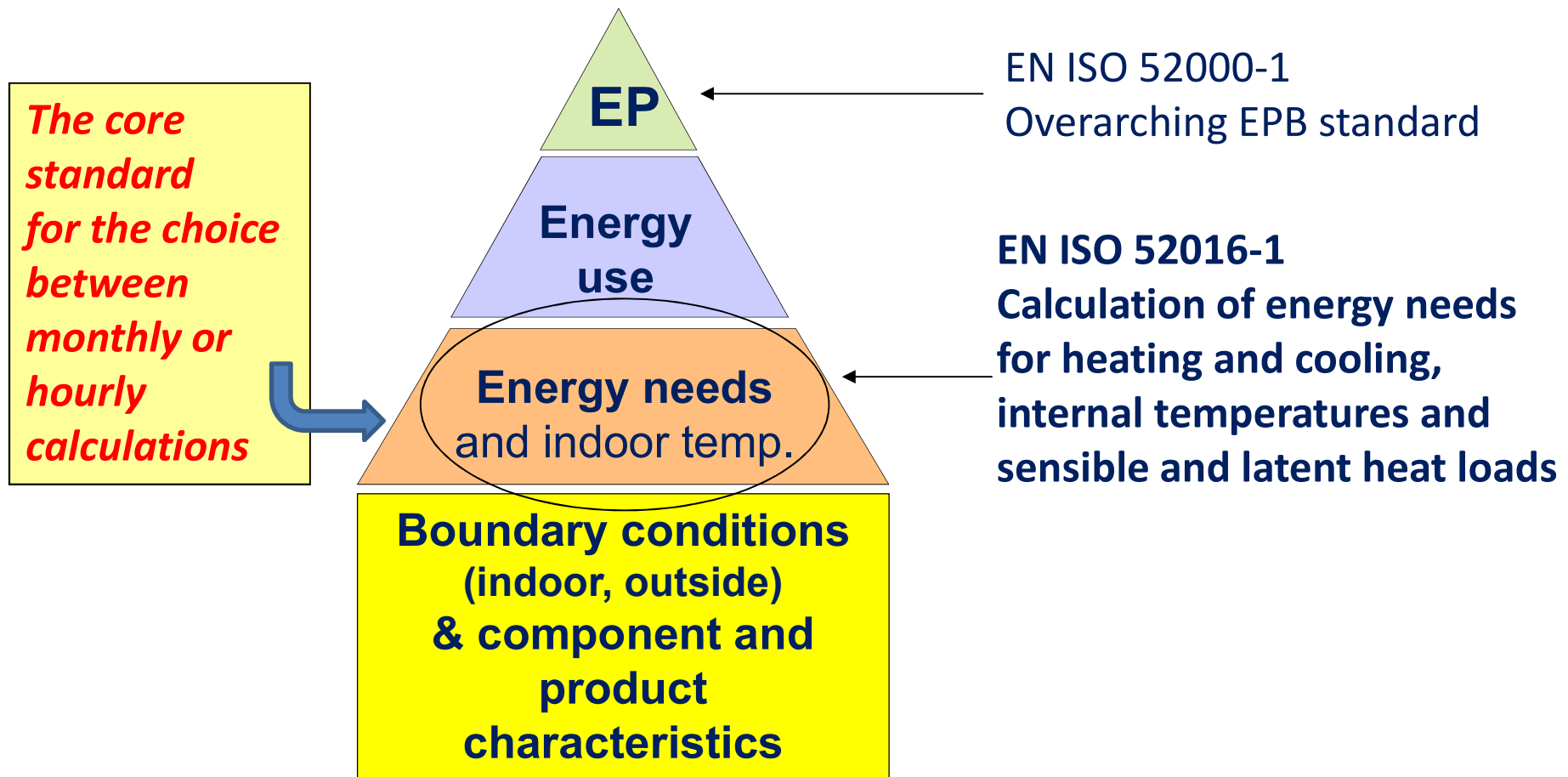


Monthly mean vs hourly....





Hourly calculation procedures of energy needs and indoor temperatures





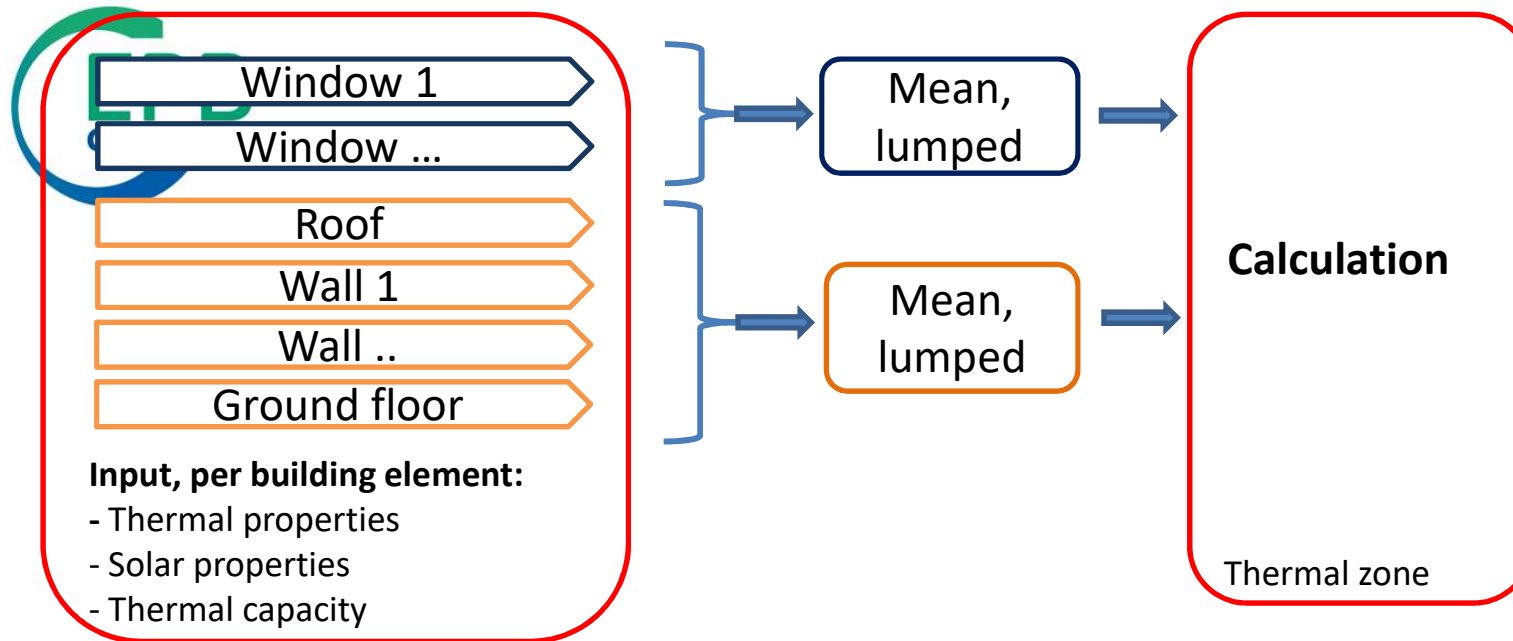
EN ISO 52016-1

Energy performance of buildings – Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads– Part 1: Calculation procedures

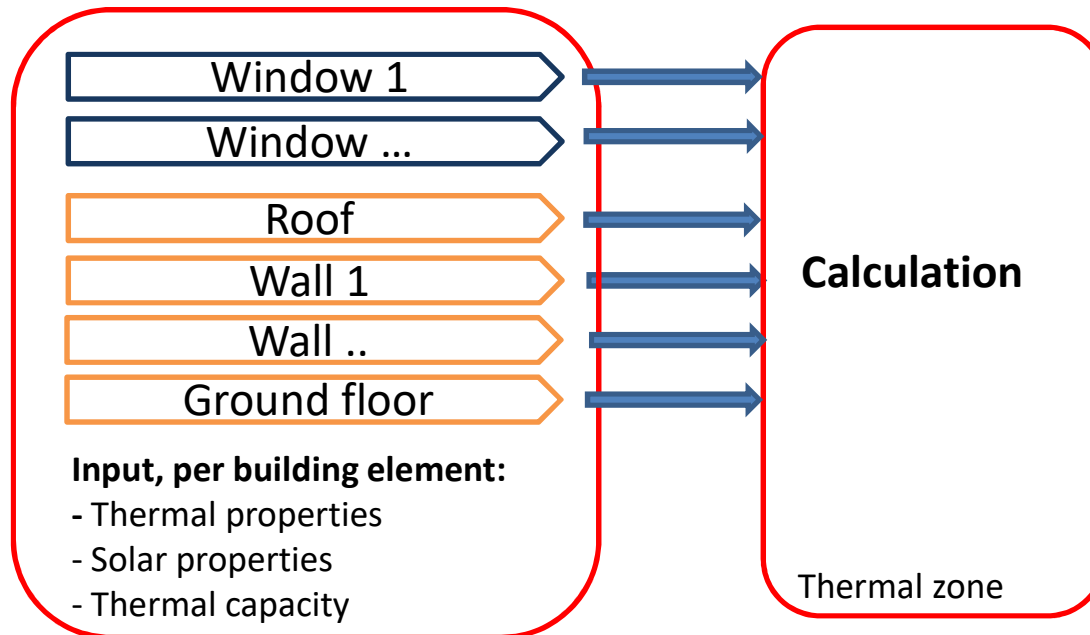
Description:

- EN ISO 52016-1 (replacing EN ISO 13790)
 - Contains (improved) -fully described- **hourly** calculation method
 - Contains (improved) **monthly** calculation method
 - **NEW! Hourly method has been tailored to the goal: the input data asked from the user are the same for hourly and monthly method**

a) Simplified hourly method in ISO 13790:2008



b) Improved hourly method (and similar for monthly method) in ISO 52016-1



EN ISO 52016-1: parallel hourly and monthly calculation methods

Hourly calculation of

- energy needs for heating and cooling
- both sensible and latent heat
- indoor temperatures
- heating and cooling load

Same input data
and boundary
conditions

Extra output:

- Monthly characteristics
- Can be used as basis for generating or validating correlation factors for monthly method

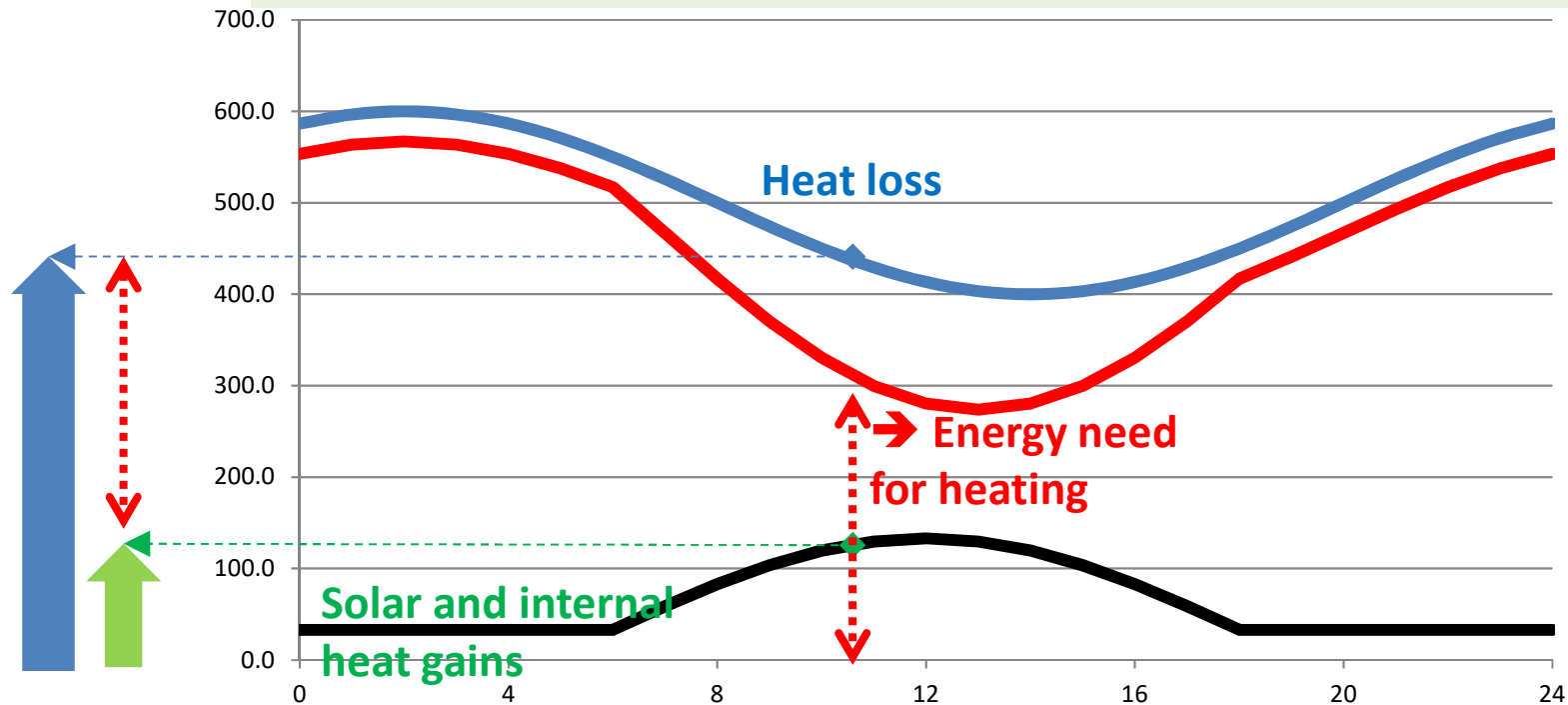
Monthly calculation of energy needs for heating and cooling

using national correlation
factors to take into account
dynamic effects

- E.g. solar and internal gains, varying conditions of use (temperature and ventilation settings), ..

Demonstrated in
Spreadsheet (update in
preparation)

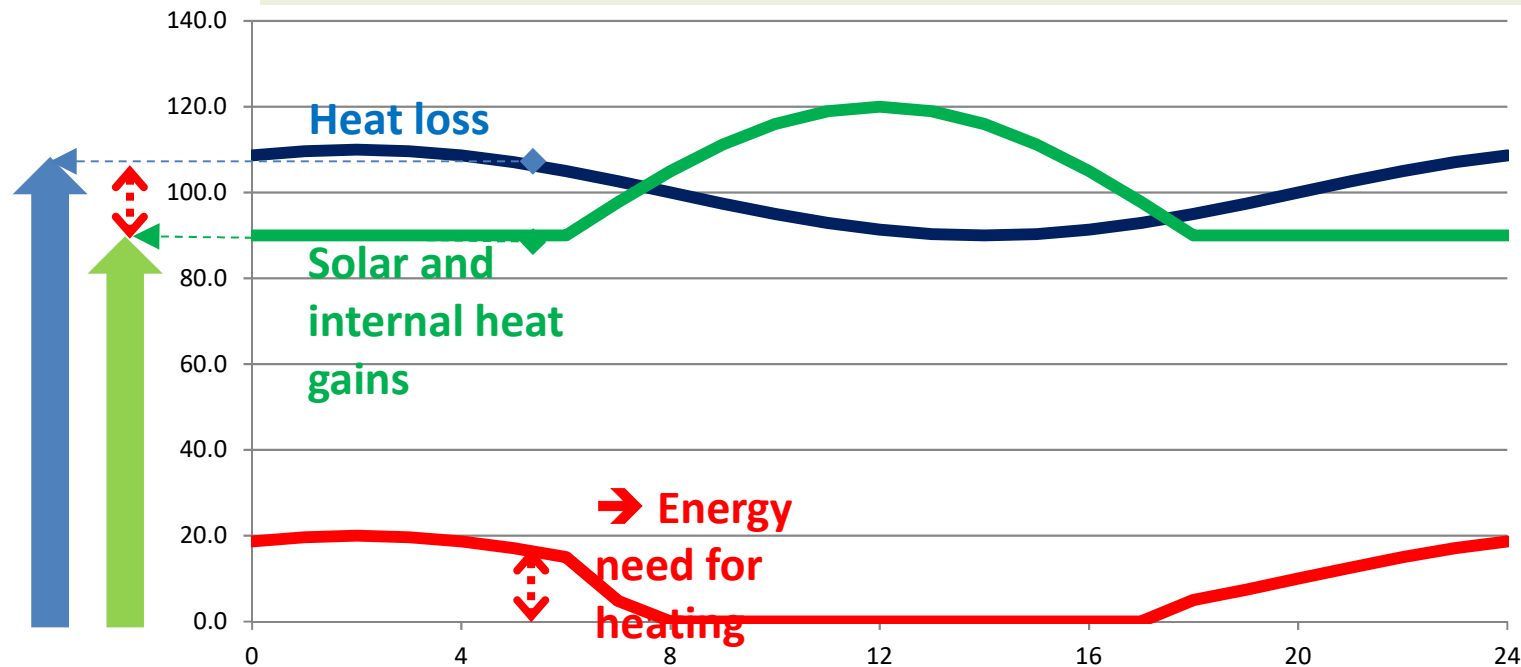
Buildings in the past



In the past:

- The high heat losses dominated the thermal balance
- A monthly calculation method leads to sufficiently accurate, transparent and robust results

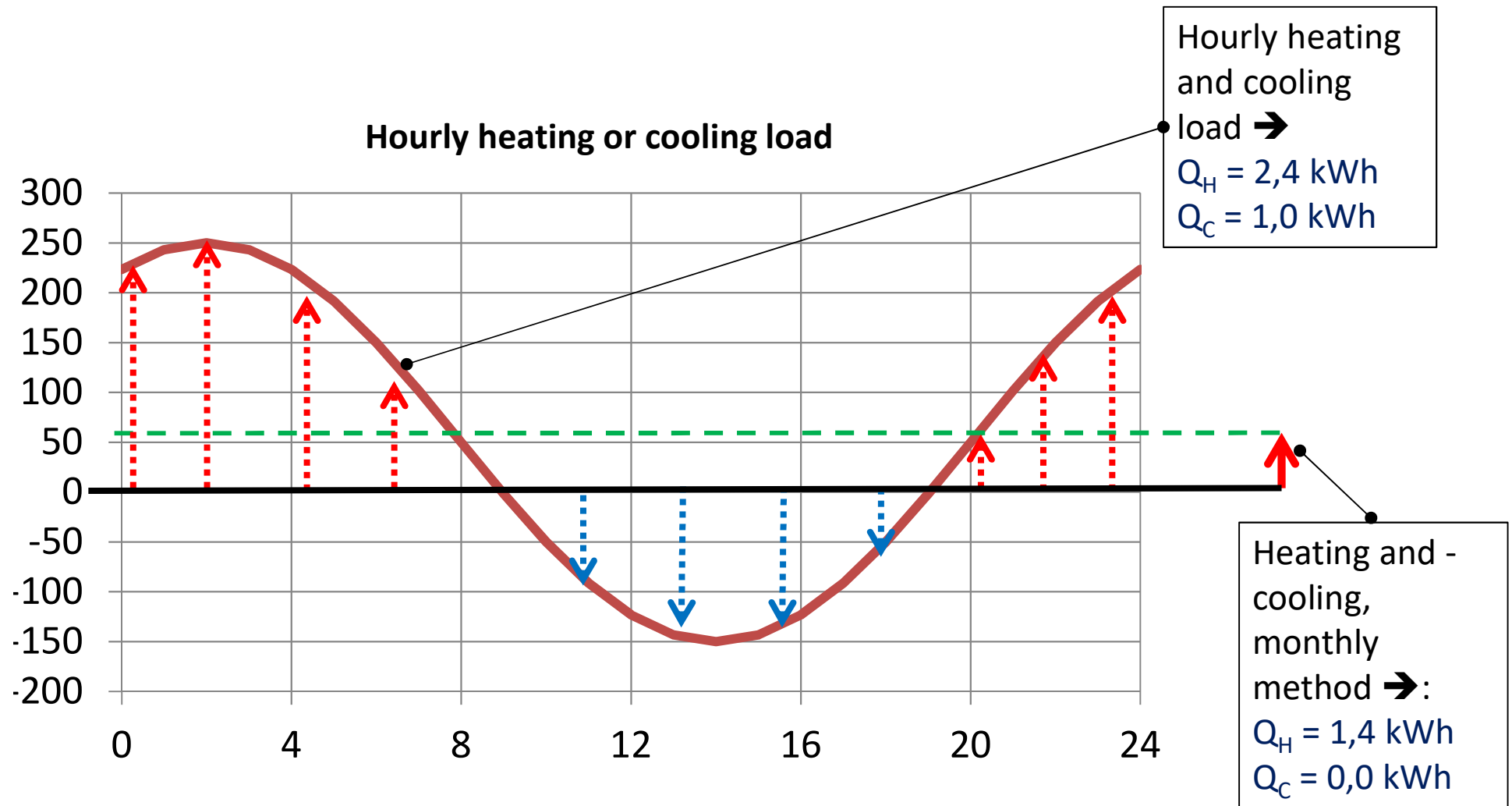
Low energy buildings



Now (new buildings or major renovation):

- The heat losses are low and no longer dominating
- Very difficult to find proper and robust correction factors for the monthly calculation method
- The monthly calculation method becomes **less** accurate, **less** transparent and **less** robust

Even possible:





EN ISO 52016-1: bridge from energy needs to systems

- EN ISO 52016-1 can also be run in a so called “**system specific mode**”, taking into account the impact of:
 - **undersized** heating or cooling **power**
 - **recoverable** heat **losses**
 - adjustment of the **temperature set-points** (value and time-schedule) due to **imperfect** system **control**
 - **limitation** of heating or cooling **season** for the calculation defined by the **operation time** of the respective technical systems
- And vice versa:
 - the hourly heating and cooling **load** and indoor **temperature** calculated in EN ISO 52016-1 can be used in the system standards as parameters that may have an **impact on the performance** of the technical systems and their components



Example of national choices *from EN ISO 52016-1*

- Main choice is between hourly and/or monthly method (choice may differ per category of buildings)

A.3 Selection of main method

Table A.2 — Choice between hourly or monthly calculation method (see 5.2)

Type of object and/or application ^b ^b
Description	Choice ^a	Choice ^a
Only hourly method allowed	Yes/No	Yes/No
Only monthly method allowed	Yes/No	Yes/No
Both methods are allowed	Yes/No	Yes/No

^a Only one Yes per column possible.

^b Add more columns if needed to differentiate between type of object, type of building or space, type of application or type of assessment. Use the list of identifiers from ISO 52000-1:2017, Tables A.2 to A.7 (normative template, with informative default choices in Tables B.2 to B.7).

Conclusion

- The main choice between a monthly or hourly calculation method is at level of calculation of heating and cooling needs and indoor temperature (EN ISO 52016-1)
- The hourly method in EN ISO 52016-1:
 - Is transparent, robust and reproducible (➔ *fit for use in context of building regulations*)
 - Is tailored to the goal: to take into account dynamic interactions
 - Requires not more input data than the monthly method



Conclusion

- The hourly method in EN ISO 52016-1
(continued):
 - Can be used to validate or find the limits of a monthly method
 - Provides a bridge to interactive system performance calculation
 - via the “system specific calculation mode”
 - via exchanging input and output to/from system standards on hourly basis

Why to use this set of EPB standards?

To reach in Europe a level playing field for our energy saving systems/products!

- *Each Member State (MS) has its own building codes. Today there is **NO real** harmonization (just the statement that the national procedures are based on EPB standards)*
- *Now the Set of harmonized EPB standards are available: Opportunity to use these at national level via a by step by step implementation of EPB standards*
- ***Producing national annexes is an essential part of this implementation process, a central support, may help MS's not to invent this by themselves.***
- *Promote MS's to implement harmonized EPB standards, and by this, a level field of rewarding innovative technologies, avoiding different certification programs per MS.*

Why implementation of the EPB standards is that important:

- If properly implemented, the benefits are:
 - **Harmonisation** of the EPB assessment procedures in Europe and possible globally via the use of these standards.
 - This will have an impact on the harmonisation of the **product** and **system requirements** for **energy relevant products** used in buildings and their HVAC, DHW and lighting systems.
 - Which is expected to have a **positive impact on innovation** by creating a level playing field for energy saving solutions

Relation EPBD and ECODESIGN Directive in Europe

- EPBD requires EU MS's to have legislation on Energy Performance of buildings
- The Ecodesign directive is a regulation on minimum product requirements, it regulates a.o. the minimum requirement on energy efficiency of a product to be allowed at the EU market.
- Energy using products need to have Label to declare this
- An EPREL database is currently set-up where all relevant product data have been included to allow the product access to the market.

M/543 on ecodesign requirements related to material efficiency aspects

The Technical Boards of CEN and CENELEC established a joint technical body to prepare standards that cover both electrotechnical and non-electrotechnical matters. Initially, this was a joint Working Group and subsequently, for operational reasons, the group was converted into joint CEN-CENELEC Technical Committee 10, known as 'Energy-related products – Material Efficiency Aspects for Ecodesign'.

The CEN-CLC/JTC 10 has created 6 Working Groups that are responsible for the development of the standardization deliverables:

- WG 1 'Terminology'
- WG 2 'Durability'
- WG 3 'Upgradability, Ability to repair, Facilitate Re-Use'
- WG 4 'Ability to re-manufacture'
- WG 5 'Recyclability, recoverability, RRR index, Recycling, Use of recycled materials'
- WG 6 'Documentation and/or marking regarding information relating to material efficiency of the product'

Continuity from the product to the system EP assessment EPBD and ECO-design connected



JWG ISO TC 163/ISO TC 205

Holistic approach



ISO TC 205 (System TC)

Technical Building Systems,
bldg environment design
(System loss calculation)



ISO TC 163 (Building TC)

Bldg energy use, envelope
characteristics, climatic data
(Building energy use calculation)



**Product TC's like ISO/TC 86;115;117;
118; etc....(Evaluation of product
characteristics)**



CENTC371

CENTC156
CENTC169
CENTC228
CENTC247

CENTC89

Building
Energy Perform.

Building
Energy use

Building Energy needs

Product characteristics; ECO-
design/energy-labelling

**Product no longer evaluated
as a product
but as a part of a system**

IMPORTANT:

Holistic approach

**is based on (tested) product
characteristics**



Various **CEN**
product TC's like:
48; 57; 62; 109;
110; 113; 147; etc.
(ecodesign
related)



Your service center for information and technical support on the new set of EPB standards

Roll out of the set of EPB standards

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Services

- Support Member States and National Standardization Bodies (NSB) to complete the national annexes of the overarching EPB standards
- Disseminate information and promote the use of the overarching and other EPB standards
- Information services for all involved stakeholders, such as industry, researchers, engineers and building professionals, financial institutions on the EPB standards



Knowledge tools & building a community of practitioners

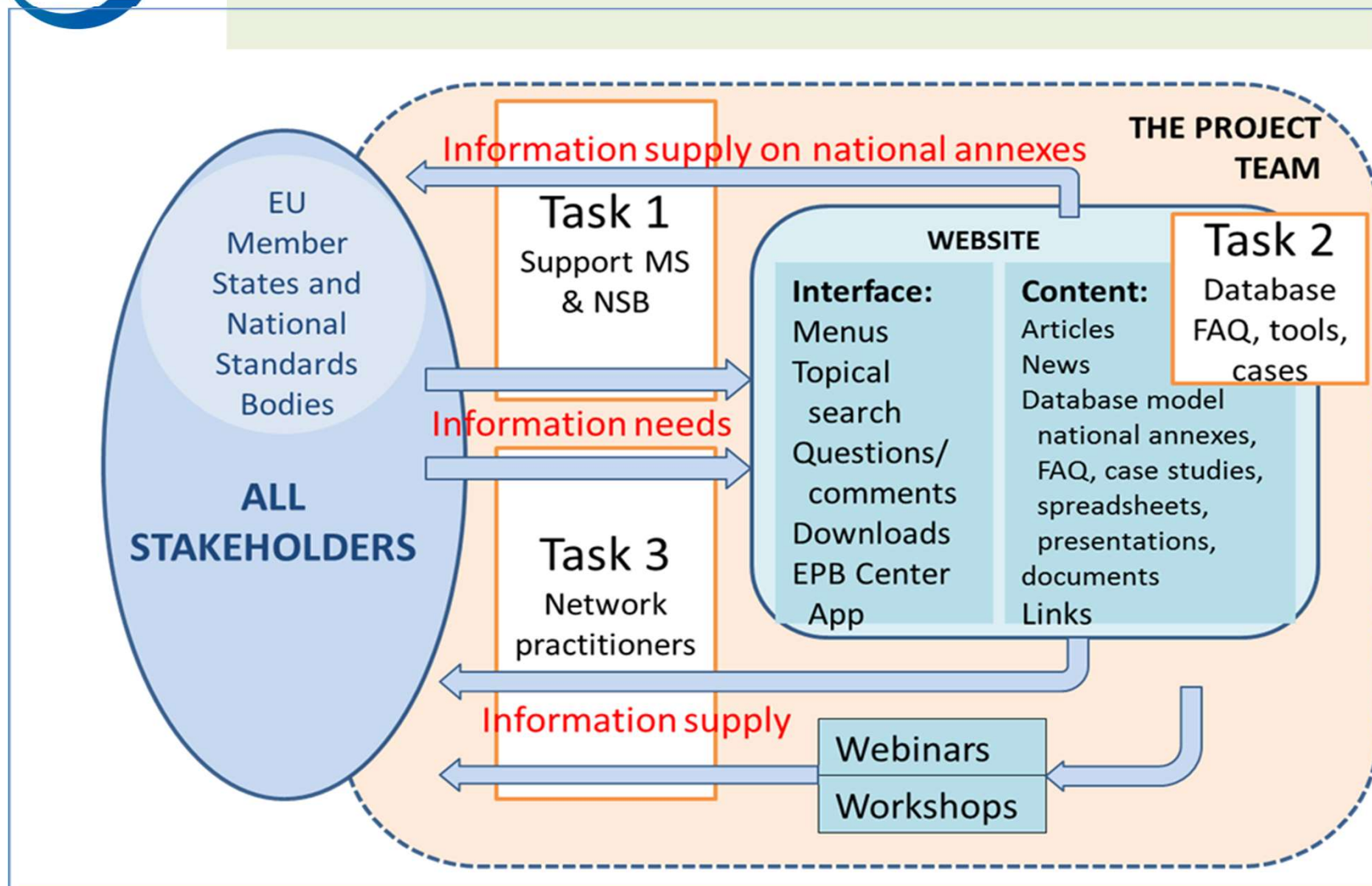
- FAQ on key issues (*How to fill in the annexes? How to use the standards?, ...*)
- Calculation tools for the individual standards
- Case study pool of practical examples tailored to the needs of different stakeholders
- Hands-on workshops and offline training sessions
- EPB Standards webinar series
- Building an EPB Standards Community of practitioners to share knowledge and support the ambitious uptake of standards



Available Supporting material : spreadsheets of calculation procedures of all EPB standards

- As part of the Mandate M/480 from EC: for each calculation standard a publicly available **spreadsheet** has been made
 - To demonstrate the correctness of the EPB calculation procedures
 - To enable a check of the list of input and output variables
- **Disclaimer:**
 - each spreadsheet was developed in parallel with the corresponding EPB standard: to detect omissions in the standard and mismatches in input-output relations
 - ➔ most recently available version of spreadsheet often reflects draft version of the standard (from 2014 or 2015)
 - ➔ not updated to the final published version of the standard .
 - **For key spreadsheets they will be updated during coming months**

Overview of tasks





National Annexes to the 'overarching' standards

Priority is given to the 'overarching' standards: mentioned in Annex 1 of the revised EPBD.

Each standard describes an important step in the assessment of the energy performance of buildings

EN ISO 52000-1: Weighted overall (primary) EP, share of renewables

- EN ISO 52003-1: Overall EP indicators
- EN ISO 52010-1: Climatic data for energy calculations
- EN ISO 52016-1: Energy needs (heating/cooling) and indoor temperatures
- EN ISO 52018-1: EP indicators at building fabric level



Case Studies

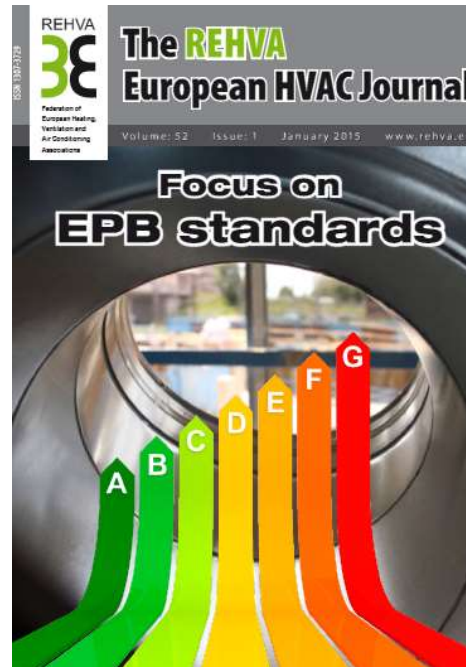
- Two types are considered: Partial and full EP calculations
 - Preparation of case studies of the application of the standards in real buildings, both residential and non-residential, across the 28 Member States and the various climatic zones of Europe
 - Mostly as partial case studies, together with a few case studies covering simplified full EP calculations.



Database of Frequently Asked Questions

- The frequently asked questions will first be formulated on current experience and questions already posed
- When placed on the website and communicated (e.g. e-newsletters), it will trigger new questions and answers
 - *A well-structured Q&A section on the website, with links to more information, will also help to find your way through the information*
- Most of the FAQs will be gathered via various parties and contacts

Public Information on several of these EPB standards see: www.rehva.eu





Thank you!

More information on
the set of EPB standards:

www.epb.center

Contact: info@epb.center



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