



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

**WHY** : do we need EPB standards to support the implementation of the Energy Performance of Buildings Directive

**and**

**what is**: Relation to ongoing EU policy developments on building performance (e.g. energy, environment, people)

Jaap Hogeling

Manager international standards at ISSO

Chair CEN/TC 371 Energy Performance of Buildings project group

Member ISO/TC 163/WG 4: Joint Working Group (JWG) between ISO/TC 163 and ISO/TC 205:

Energy performance of buildings using holistic approach

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This EPB Center is supported by the EU-Commission Service Contract ENER/C3/2017-437/SI2.785185

Start 21 September 2018 for 3 years

**BUILD UP Webinar series**  
**Webinar 2: EPB standards overview: why, how, what!**  
**March 19, 2020**



# My background



- CEN/TC 371: Energy Performance of Buildings project group, chairperson since 2004
- Project leader of the EU Mandate/480 to CEN regarding the development of the set of EPB standards.



- Participation in 5 CEN/TC's and 2 ISO/TC's related to Energy Performance of Buildings
- Manager international standards at ISSO, Rotterdam, the Netherlands
- Initiator of EPB Center (an initiative of ISSO and REHVA)
- Fellow of ASHRAE and REHVA



## 2010: EU Mandate/480 to CEN, .... supporting the EPBD implementation.

- FOR THE ELABORATION AND ADOPTION OF STANDARDS FOR A METHODOLOGY CALCULATING THE INTEGRATED ENERGY PERFORMANCE OF BUILDINGS AND PROMOTING THE ENERGY EFFICIENCY OF BUILDINGS, IN ACCORDANCE WITH THE TERMS SET IN THE RECAST OF THE EPBD (2010/31)

### **The set of EPBD standards shall:**

- be systematic, clear and comprehensive package
- benefit professionals, **EU Member States and relations with third countries.**
- Have a **continuous but modular overall structure enabling a step-by-step implementation** by EU MS's.
- have a **balance between the accuracy and level of detail,**
- Have **flexibility: Not a “one size fits all”, but: harmonized with national choices (-> see webinar 1)**
- **Follow a holistic approach, as key driver for technological innovation and change**

# Increased urgency

## Paris Agreement 2016



- ... to keep global warming below 2°C above pre-industrial levels and to make efforts to limit the temperature rise to 1.5°C above pre-industrial levels
- ...
- **EUROPE:**
- **Revised EPBD 2018 and Annex I**
- **December 2019: GREEN DEAL**

## Revised EPBD 2018: Towards more transparency (Annex I ) and better data



### New obligation to describe national calculation methodology following the national annexes of the overarching EPB standards

(EN ISO 52000-1, 52003-1, 52010-1, 52016-1, and 52018-1 developed under mandate M/480)

- Considerations for the **calculations of Primary Energy Factors (PEFs)**
- National calculation methodologies must reflect the energy needs of a building respecting the **IEQ in buildings** (where people are for > 80% of time)
- Pursuing the **optimal EP of the building envelope**
- Requirement for EPC databases to allow gathering data for the (measured or calculated) energy consumption of buildings

# Building and renovation: Start Renovating Now

## Green Deal December 2019

➤ Buildings account for  
**40%** of energy consumed

Source: Eurostat, Energy balances 2019 edition, final energy consumption in year 2017.



The current rates of renovation of public and private buildings should at least double

### Better energy performance of buildings

➤ Prices of different energy sources should incentivise **energy-efficient buildings**



➤ Design of buildings should be in line with the **circular economy**



➤ Increased **digitalisation**



➤ More **climate-proofing** of buildings



➤ Strict enforcement of rules on **energy performance of buildings**

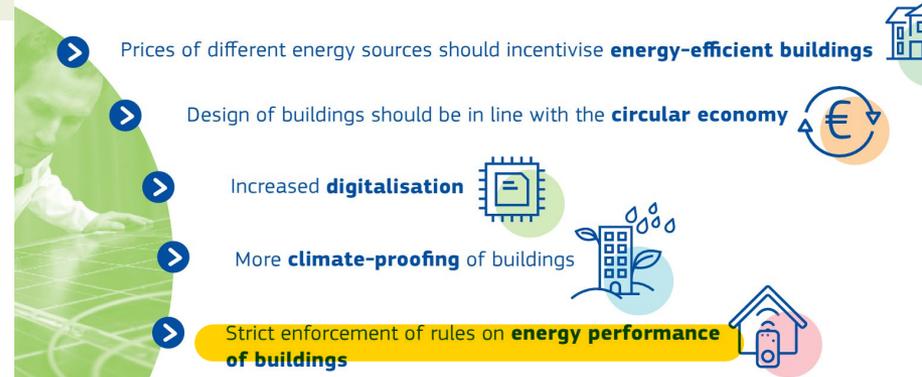




# SET of EPB standards supports the EU Green Deal & EPBD implementation

- Energy Efficiency First
- Use of Renewable Energy
- Monitor the NZEB uptake and cost optimal minimum EP Requirements
- Reinforce the EP Certification
- Enhanced Transparency/Consistency of the EP assessment procedures allowing flexibility
- Long-term renovation strategy of MS's towards decarbonisation of the building stock by 2050 and maintaining or achieving healthy IEQ in buildings
- Optimal partial EP of building envelope and systems
- Transparency/Consistency on the use of PEF and CO2 emission factors

## Better energy performance of buildings

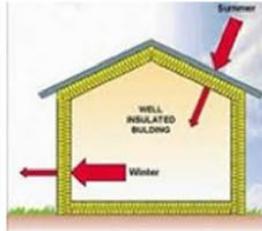
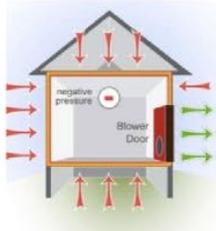
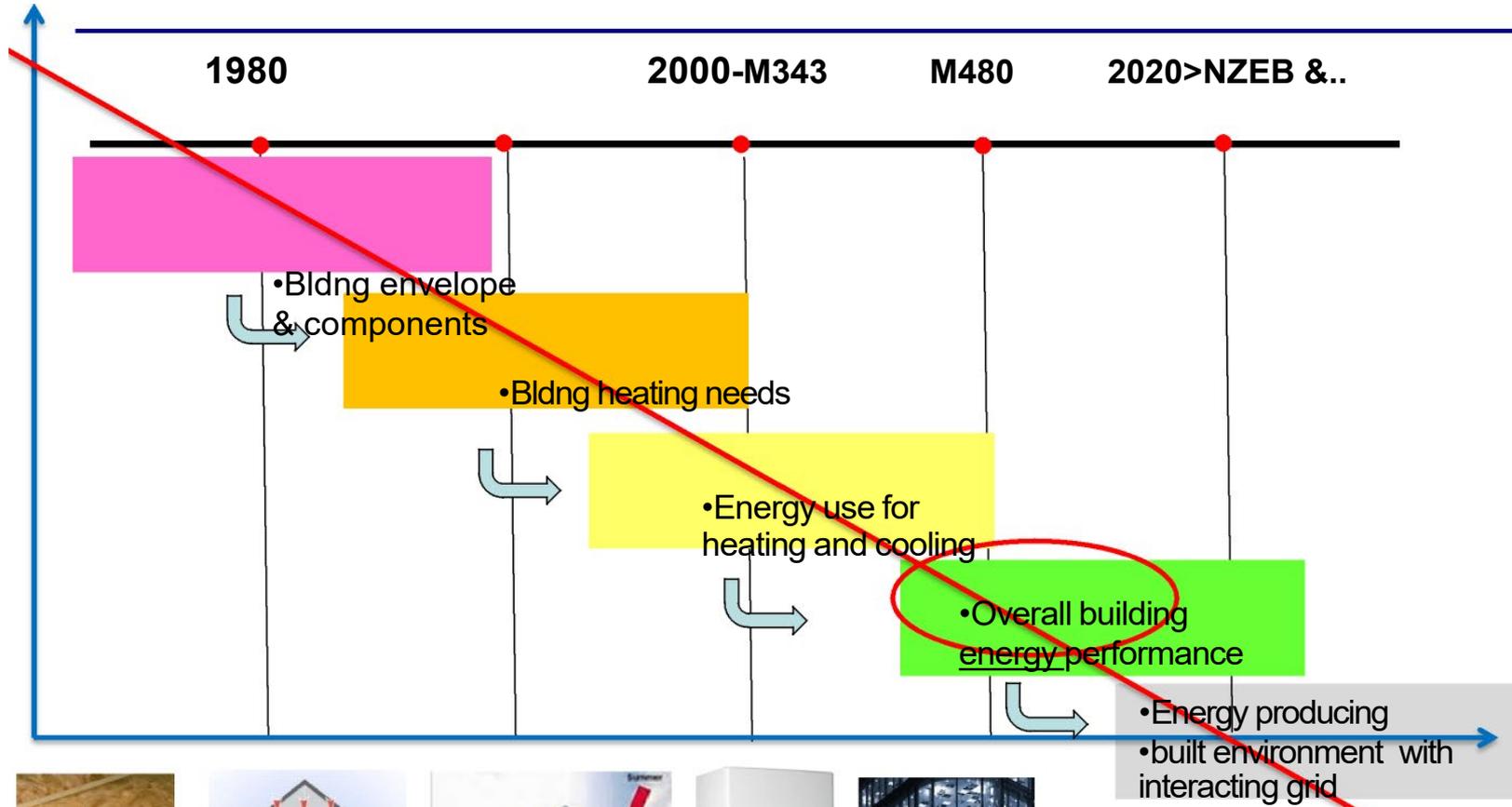




## Why this Mandate M/480-2010 on EPBD for CEN?

### Why a set of European/international EPB standards?

- Supporting **harmonization** of the various measures improving energy efficiency of buildings and their energy using systems.
- “**Harmonization** is the process of minimizing redundant or conflicting standards which may have evolved independently”.
- “**Harmonization** cuts compliance costs and simplifies the process of meeting requirements”
- Increase the **accessibility, transparency** and **objectivity** of EP-assessment of buildings and connected energy infrastructure (defining Primary Energy Factors and CO2 emission factors).
- **Avoid new trade barriers for energy related products and services in Europe and beyond**
- Adopt the same structure for EP assessment procedures: – the **starting point for national/regional building codes on EPB**





# consistent set of standards to assess overall Energy Performance of Buildings



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

To support the EPB Directive (EPBD)

- For energy performance certification and to check compliance against minimum EP requirements
- Harmonized procedures, but:  
with flexibility for national situations

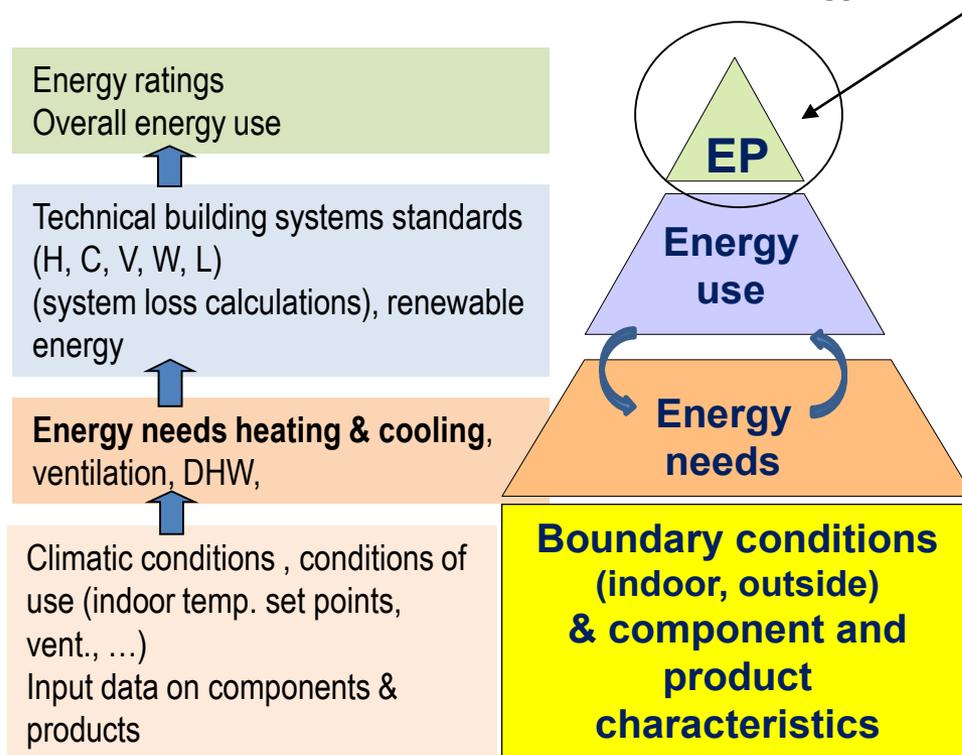
&

**As basis for the customised advise to renovate the existing building stock**



# Set of EPB standards: the holistic approach

From *product* standards to *overall* energy use



EN ISO 52000-1

Overarching EPB standard

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

Example:  
Requirement  
in building regulation :  
“Overall EP < 50 kWh<sub>pEnren</sub>/m<sup>2</sup>”

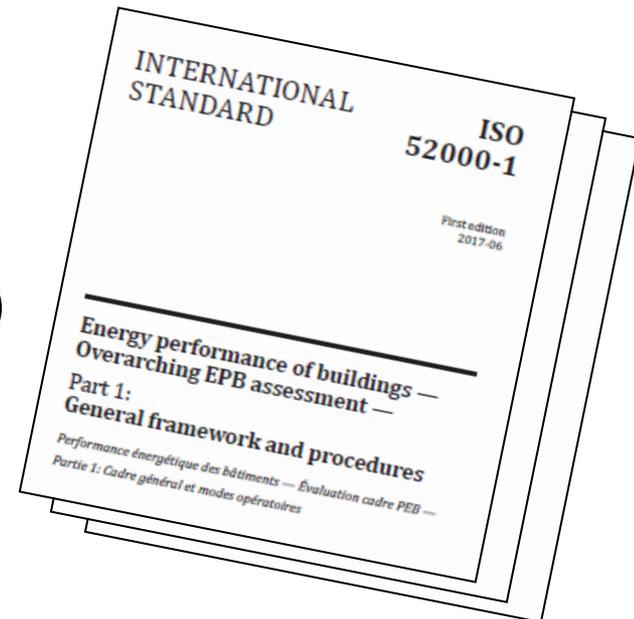


# Set of CEN standards on Energy Performance of Buildings (EPB)

- 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**

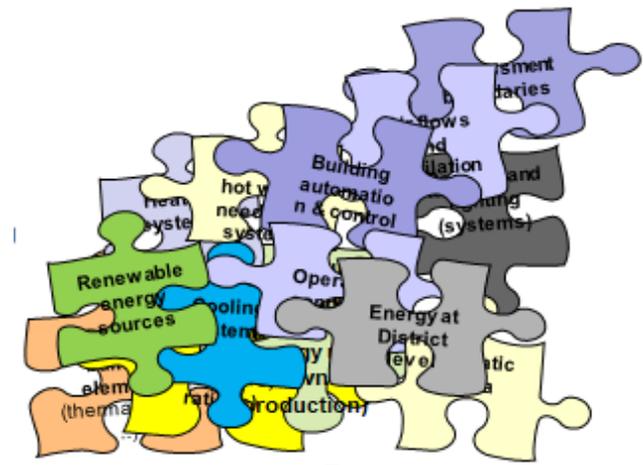




## Set of EPB standards: **coherent** but flexible

- Each EPB-standard respects specific requirements to ensure overall integrity, consistency and quality of the whole set (both in CEN and in ISO)

- *Because there are many interactions between the standards: heating, lighting, cooling, ...*







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

- The EP shall be expressed in kWh/(m<sup>2</sup>.y) primary energy use and MS's are encouraged to include the connected GHG emission produced in kgCO<sub>2</sub>.eq/(m<sup>2</sup>.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



# Flexibility is achieved by having in all EPB standards and annex A & B

- **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:
  - It is expected that choices (levels of simplification ) and input data (related to the national building regulations ) may differ for:
    - Existing buildings
    - Residential and non-residential buildings
    - New (NZEB) building designs (where more detailed data is available)
    - Use of the EPB assessment for deep renovation towards NZEB
    - Etc...



# Observation regarding the set of EPB Standards

- **This modular, transparent, unambiguous, but flexible\* set of EPB standards is:**
  - **The important instrument to support the proper implementation of the EPBD**
  - **Supporting the defining of Nearly Zero Energy Buildings (NZEB)**
  - **Supporting the decarbonisation of the building stock by 2050**



\*: for local climate, national legal framework, building tradition, building use, energy infrastructure, etc...



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## Roll out of the set of EPB standards

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## Services

- Support Member States regulators 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



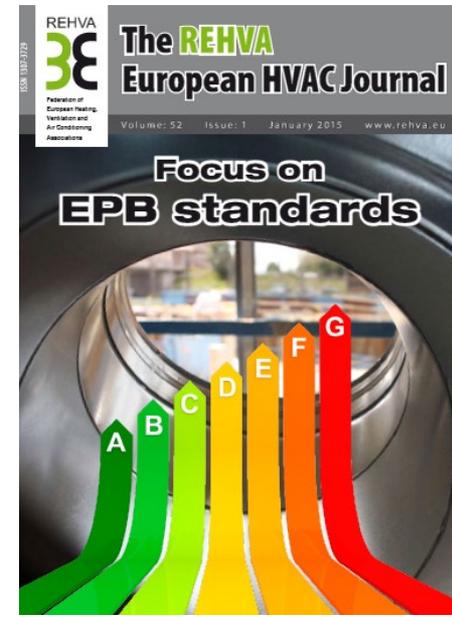
## Knowledge tools & building a community of practitioners

- FAQ on key issues (*How to fill in the annexes? How to use the standards?, ...*)
- Calculation tools (spreadsheets) 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



Public Information on several of these EPB standards  
see: [www.rehva.eu](http://www.rehva.eu)

More information on the set of EPB standards:  
[www.epb.center](http://www.epb.center)  
Contact:  
[info@epb.center](mailto:info@epb.center)



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Thank you for your attention





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**How** by design the EPB standards are meant to facilitate the EU-wide transition to a sustainable built environment

**Dick van Dijk**

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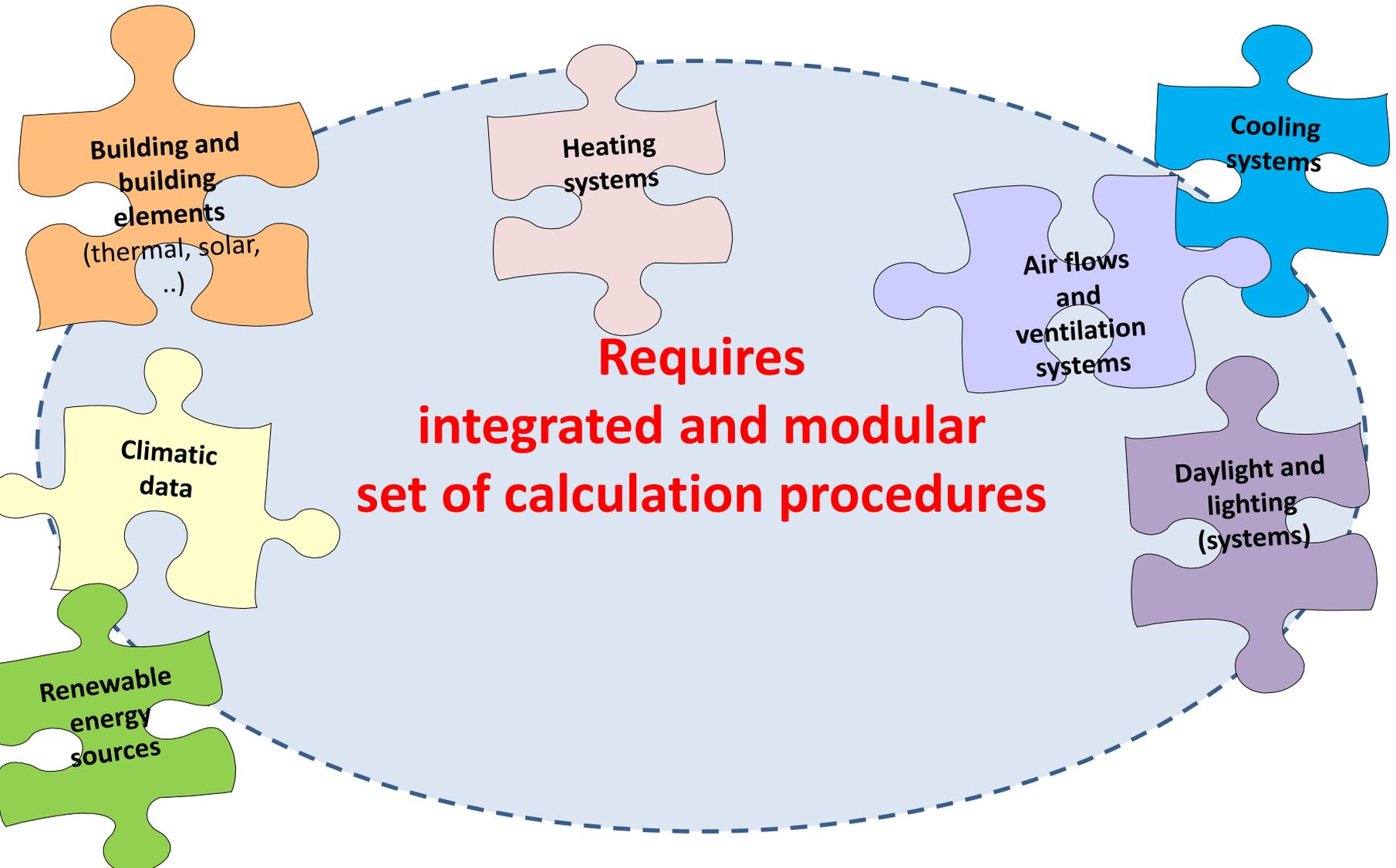
# My background



- EPB Center expert (> 2017)
- Involved in initiation, preparation and coordination of set of EPB standards (2012-2017)
- Co-convenor of ISO Joint Working Group on the overall set of EN ISO EPB standards, in collaboration with CEN  
*ISO/TC 163 & ISO/TC 205, CEN/TC 371*
- Convenor of ISO Working Group responsible for few key EPB standards:  
Energy needs heating/cooling, Climatic data, Partial EP indicators (ISO/TC 163/SC 2/WG 15)

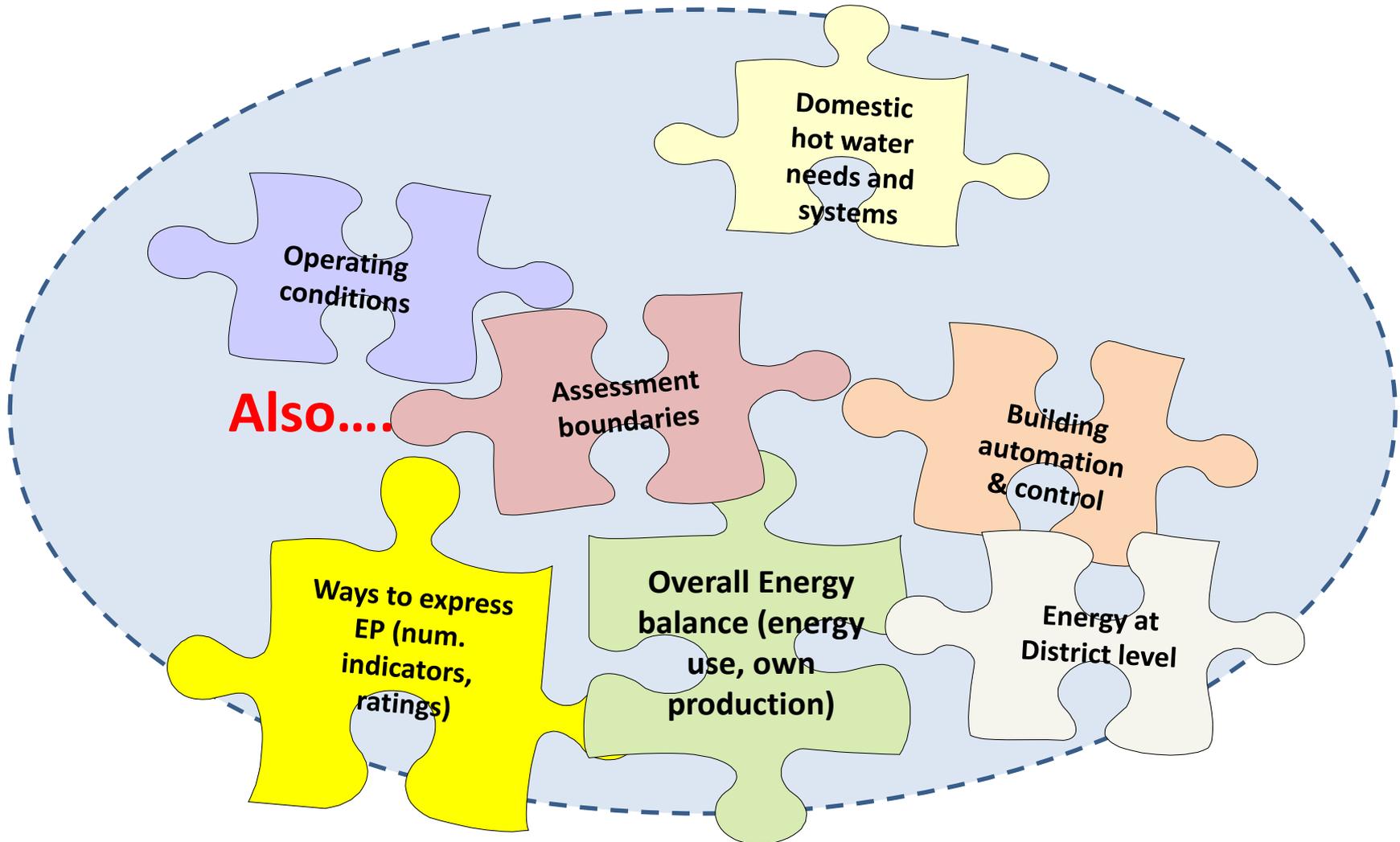


# Overall energy performance of buildings (EPB)



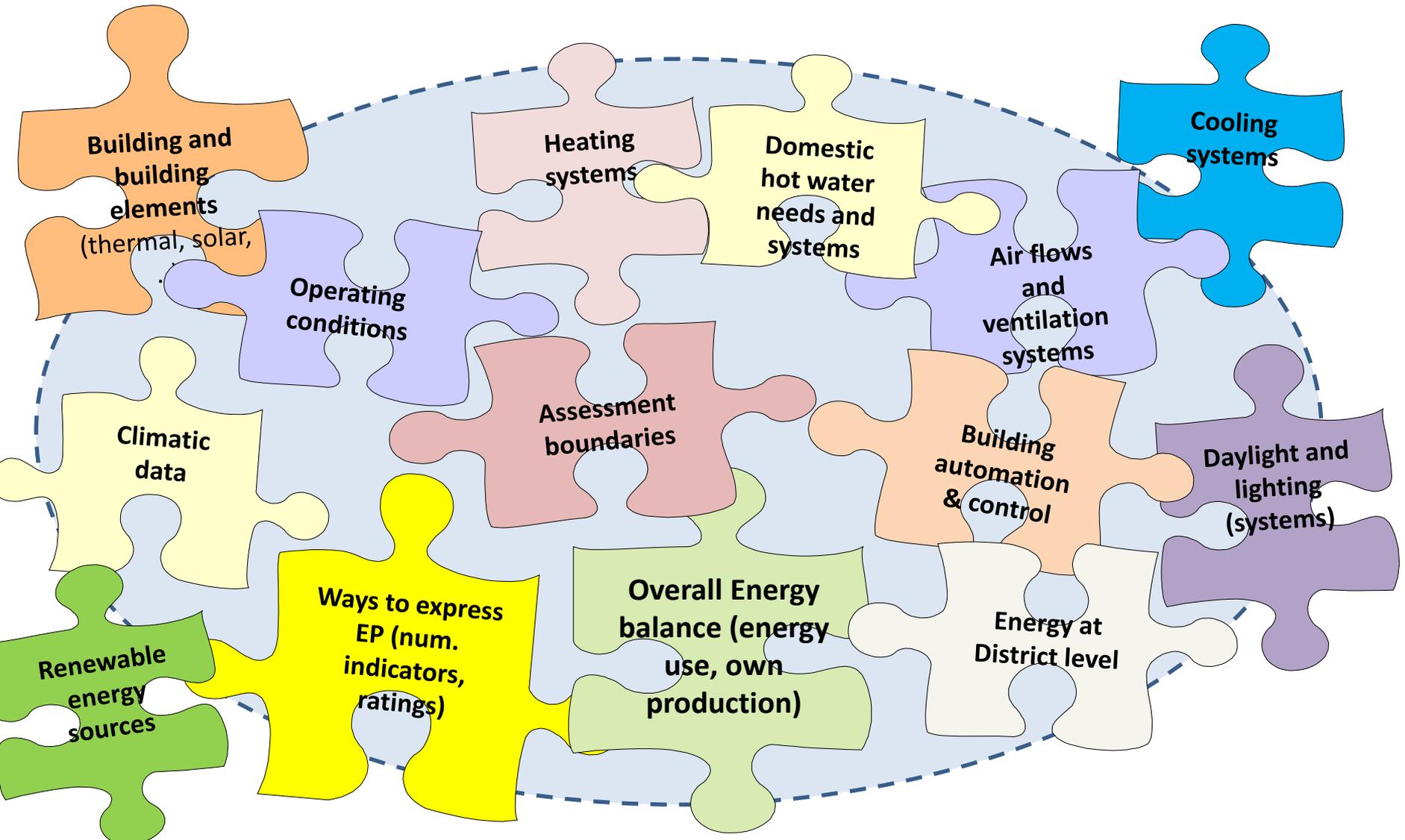


# Overall energy performance of buildings (EPB)





# Overall energy performance of buildings (EPB)



**Building and building elements**  
(thermal, solar,)

**Operating conditions**

**Climatic data**

**Renewable energy sources**

**Ways to express EP (num. indicators, ratings)**

**Assessment boundaries**

**Heating systems**

**Domestic hot water needs and systems**

**Overall Energy balance (energy use, own production)**

**Air flows and ventilation systems**

**Building automation & control**

**Energy at District level**

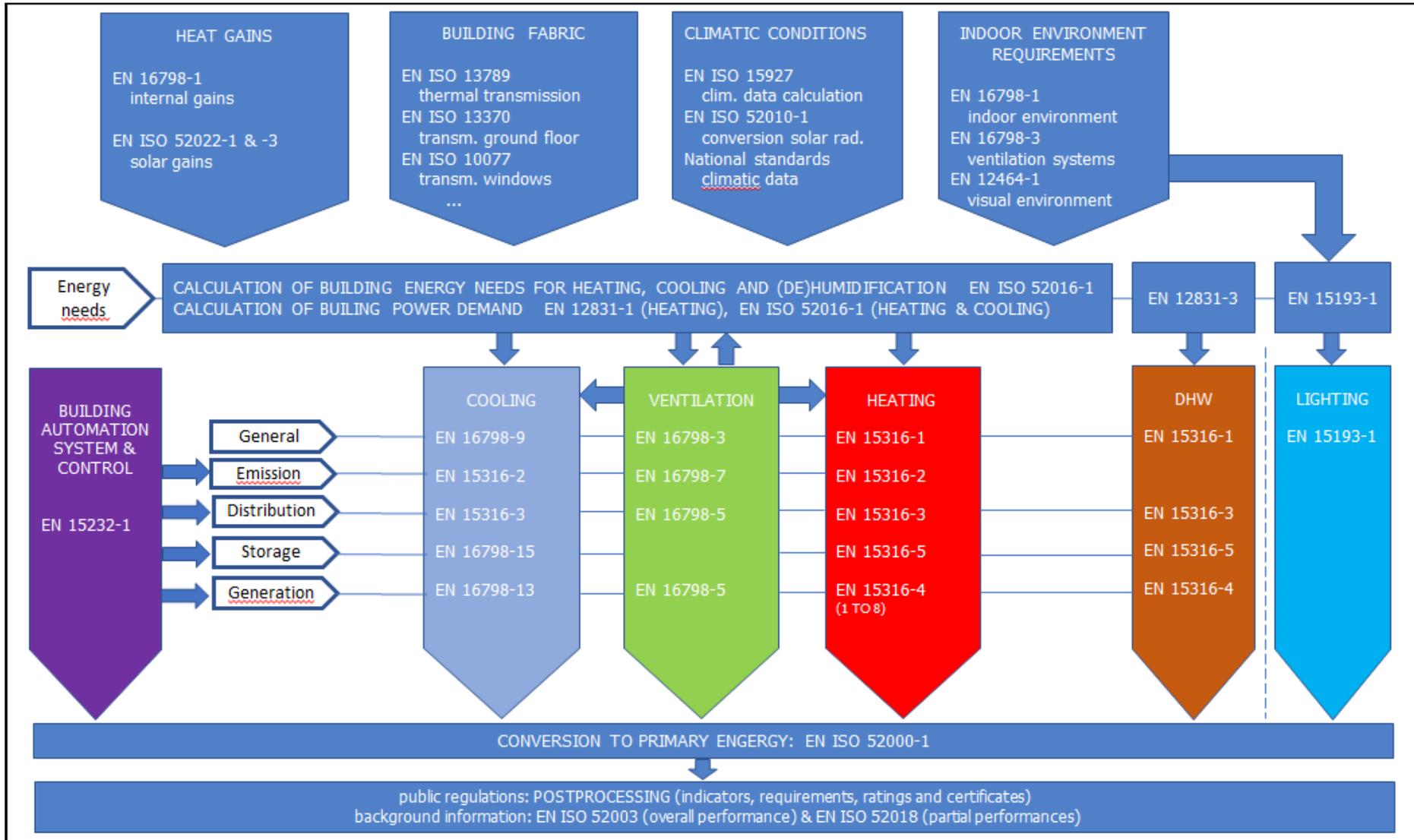
**Cooling systems**

**Daylight and lighting (systems)**



# The result...

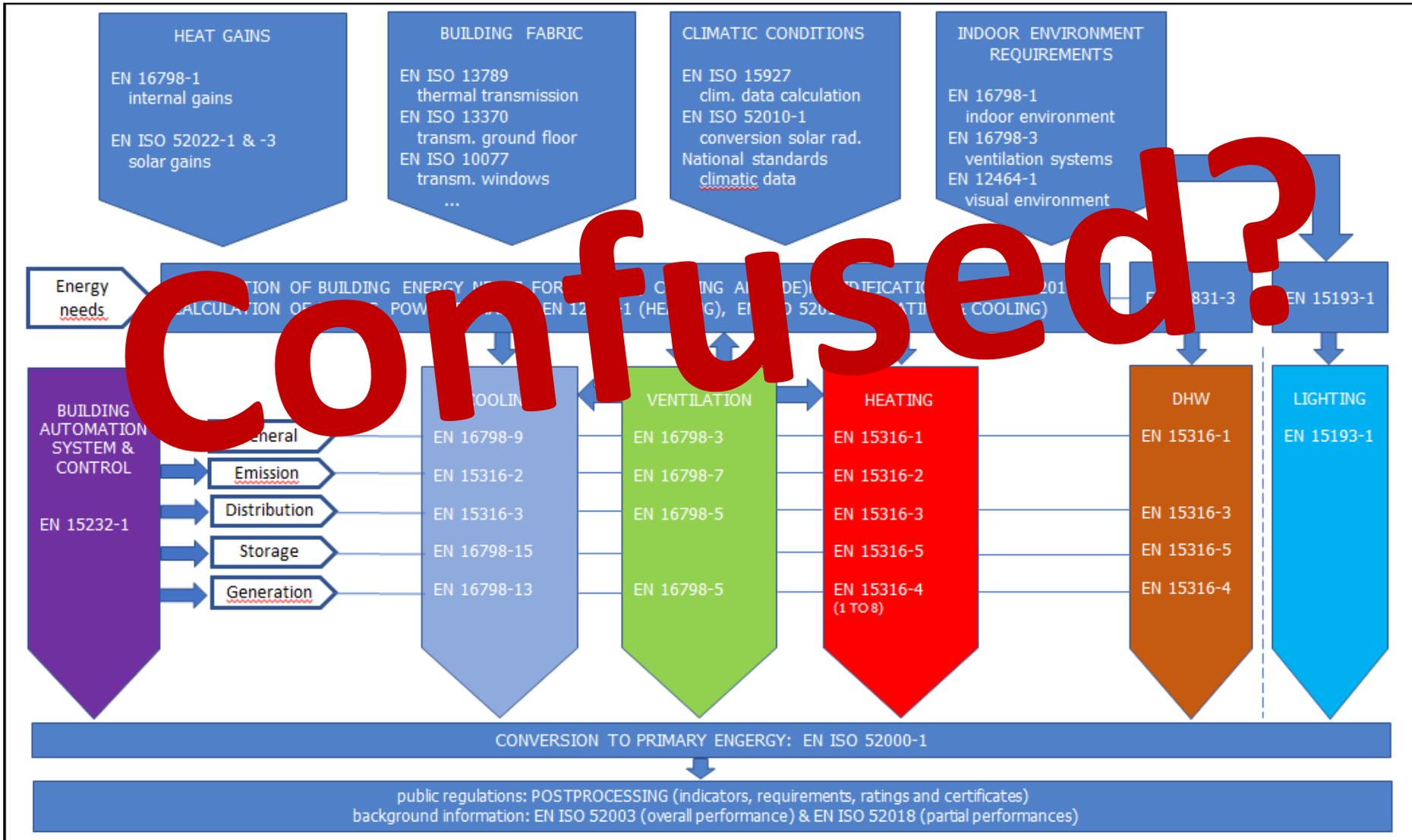
*presented at webinar 1, Feb 4, 2020)*





# The result...

*presented at webinar 1, Feb 4, 2020)*



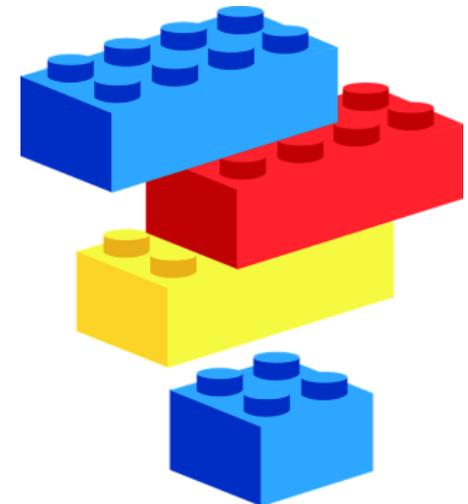


# Don't worry!

- Short video explains overall scheme
  - Go to [epb.center/documents](http://epb.center/documents) (-> presentations)



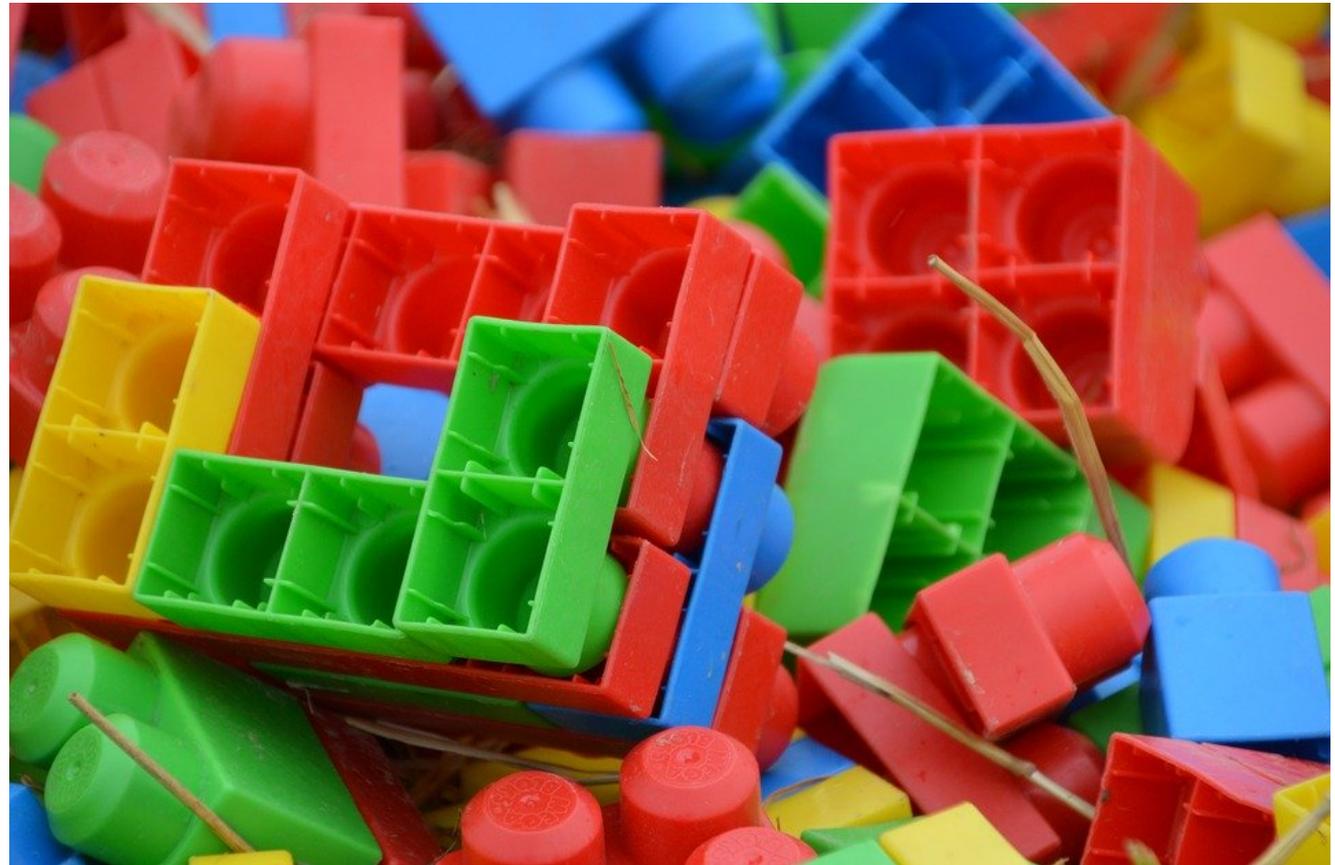
- Core of EPB calculation method:  
only handful of EPB standards





True: Set of EPB standards  
> 50 documents

But....





# The set of EPB standards

Not only calculation procedures!

- Several: on energetic properties of components /products

- *E.g. U-value of window or wall*
- *Used by manufacturer or supplier*





# The set of EPB standards

Not only calculation procedures!

- Several: on boundary conditions
  - *E.g. climatic conditions*
  - *E.g. standard conditions of use*
  - Usually **fixed** by national or regional regulators





# The set of EPB standards

Not only calculation procedures!

- Other: on special topics

*E.g.:*

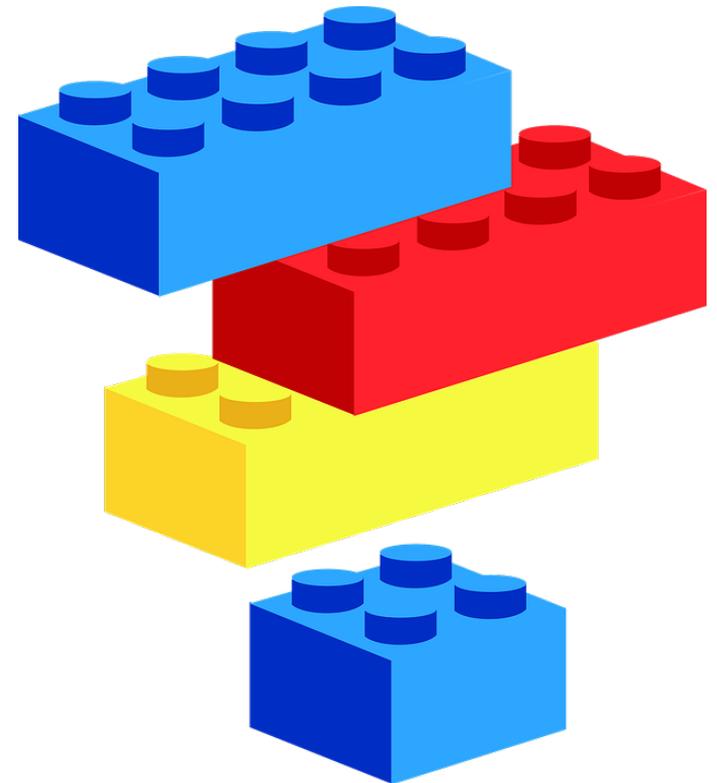
- *Guidance on inspection*
- *Economic evaluation procedures*
- *System (design/sizing) requirements*
- *Measured energy performance*
- *Reference procedures*





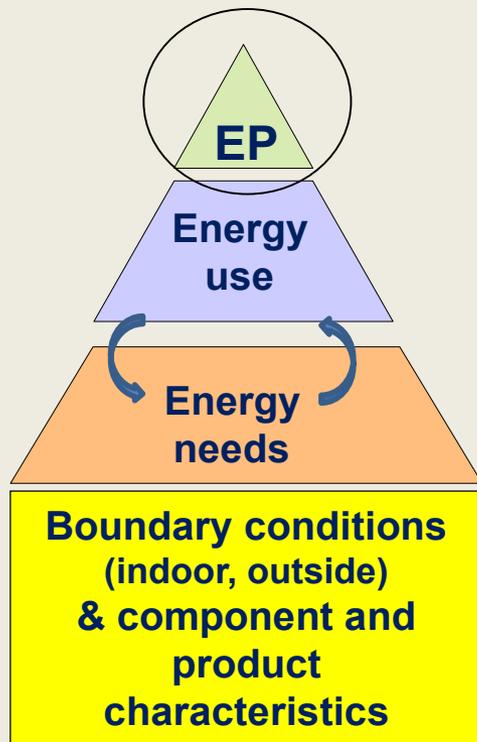
# Conclusion

Set of EPB standards includes many standards not needed for practitioners to assess EP of specific building!



# Five key EPB calculation standards

## EN ISO 52000-1, Overall EPB Framework (common terms, modular structure, ...)



EN ISO 52000-1 Aggregation & conversion to primary energy

EN ISO 52003-1  
Overall indicators,  
requirements, ratings

<< *Several system standards* >>

EN ISO 52016-1 Energy needs  
heating and cooling

EN ISO 52018-1  
Partial indicators  
(building fabric, needs)

EN ISO 52010-1  
Climatic conditions

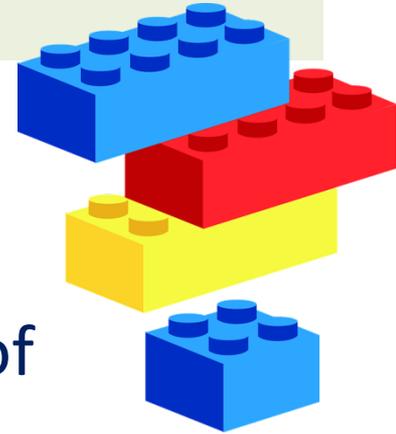
# Moreover...

- Detailed calculation procedures, but
  - in practice: software tools
  - Number of **input** data  $\neq$  Complexity of calculation **method**

***Tip: Webinar 4 (May 26):***

***on hourly versus monthly method!***

- in numbers, most input data = building envelope:  
'nothing new'  
(and.....: function of national zoning rules!)
- increasing number of product data are in data bases





# (EN) ISO 52000 family

All new or strongly revised (since 2017) EPB standards at global level (CEN and ISO): *member of the new **ISO 52000 family***

*= international standards on EPB using holistic approach*

- Strong brand name
  - Overarching **framework** (EN ISO 52000-1)
  - Common **quality** requirements
  - Overall **consistency** (incl. output -> input links)
  - Common **format**
  - **Managed** by multi-disciplinary international team of experts (*ISO/TC 163, ISO/TC 205, CEN/TC 37, with contributions from sister committees representing specific disciplines*)
  - Explanation, justification and examples in accompanying set of **Technical Reports** (e.g. CEN ISO/TR 52000-2)
  - Validation and worked examples in accompanying **spreadsheets**



# Frequent misunderstanding (1)

*“I don’t believe in a ‘one-size-fits-all’ method for such diversity of countries (Europe, global)”*



## Response:

*(Based on EU Mandate)*

EPB standards  ‘one-size-fits-all’!

EPB standards  harmonized approach,  
with **flexibility** to **tailor** to national situation

*See next slide...*

# No “One size fits all”

- Many options to **tailor** to national/regional situation. *See recording of webinar 1 (Feb. 4, 2020)*

User behaviour	External influences	Cultural influences
<b>Number of users</b> 	<b>Actual climate</b> (cold/warm winter/summer) 	<b>building tradition</b> 
<b>Ventilation etc. behaviour</b> 	<b>Actual climate on site</b> (next to sea, in a windy place, etc...) 	<b>building typologies</b> 
<b>Temperature etc. set points</b> 	<b>Actual location (latitude)</b> 	<b>culture</b> 
<b>Use of shading devices</b> 	<b>Shading from other buildings/trees</b> 	<b>policy and legal frameworks</b> (including the type and level of quality control and enforcement) 
<b>Maintenance of equipment</b> 	<b>Annexed buildings</b> 	



## Frequent misunderstanding (2)

*“In the EPB standards I can’t find the **EP requirements**, like minimum values for efficiencies, maximum values for energy use, ...”*



### Response:

- **Methods** and **scales** = the EPB standards
- **Requirements** and **limits** = (trans-)national or regional regulations

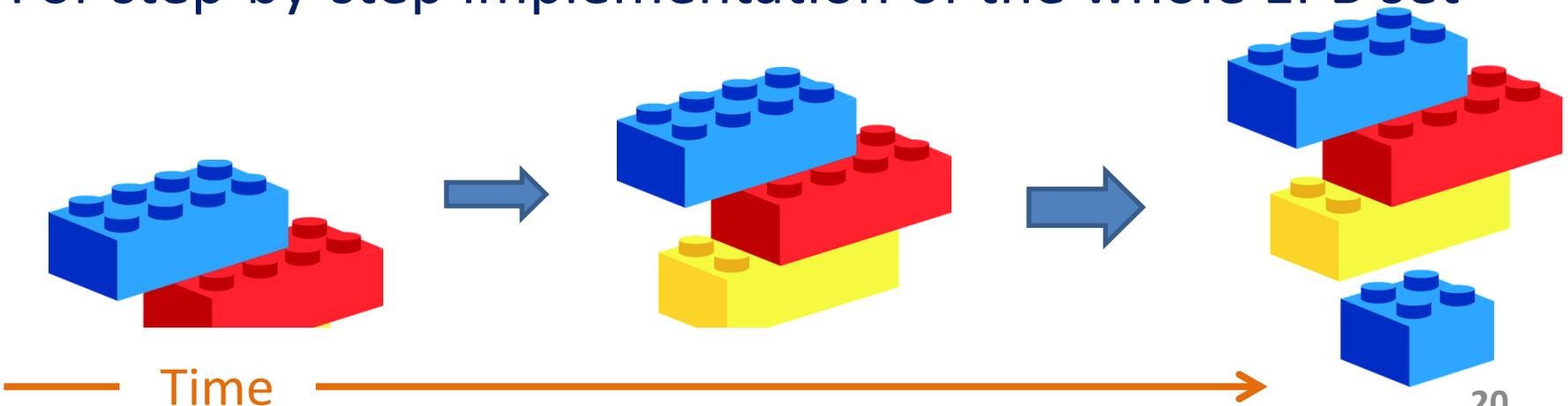
*Tip! Webinar 3 (April 16): focus on **scales** = EP indicators, requirements and rating*

# Step-by-step implementation

Flexibility also applies to references to other EPB standards

- ~~Reference to a specific EPB standard~~
- Reference to a specific national standard  
*if fits in the modular system (consistent input and output)*

For step-by-step implementation of the whole EPB set





## So it is all really simple?

Well, of course:

- NZEB asks for
  - novel technologies
    - Designed, operating and interacting correctly
    - under time varying, low energy use conditions
  - specific technologies = specific EPB standards
    - Heat pump, renewable energy, heat storage, adaptive facades
- Simpler buildings = simpler calculations
  - *Only partly true: to get simple buildings to NZEB level may not be simple*



# Conclusion

- The set of EPB standards to assess the energy performance of buildings
  - Harmonized, transparent and consistent
  - Flexible: to tailor to national/regional climate, building tradition, legal framework, ..
  - Modular
    - Step-by-step implementation
    - Regular maintenance and updating (knowledge, technologies)
  - Fit for nearly zero energy buildings, new or renovated
  - Small core of standards, with others for specific applications
  - (EN) ISO 52000 family, with common quality requirements

*Even if you are more familiar with the subject (EPB standards, regulations)... you probably (still) have many questions*

- *Ranging from: “What is ‘EN ISO’?” to “What are links with EPBD?”*
- *Or maybe you have more technical questions....*
- *Please check the FAQ sections at our website or contact us ([www.epb.center/contact](http://www.epb.center/contact))*



Thank you!

*EPB Center is also 'available' for specific services requested by individual or clusters of stakeholders*

More information on the set of EPB standards:

[www.epb.center](http://www.epb.center)

Contact: [info@epb.center](mailto:info@epb.center)



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## Trustable information: online resources & tailored services

REHVA

**3E** Federation of  
European Heating,  
Ventilation and  
Air Conditioning  
Associations

Andrei Vladimir LIȚIU

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# WHAT! #EPBstandards



All building sector stakeholders



Online information resources  
+ Tailored services



Guidance to reap all benefits



# Social media #EPBstandards



[EPB Standards Community](#)



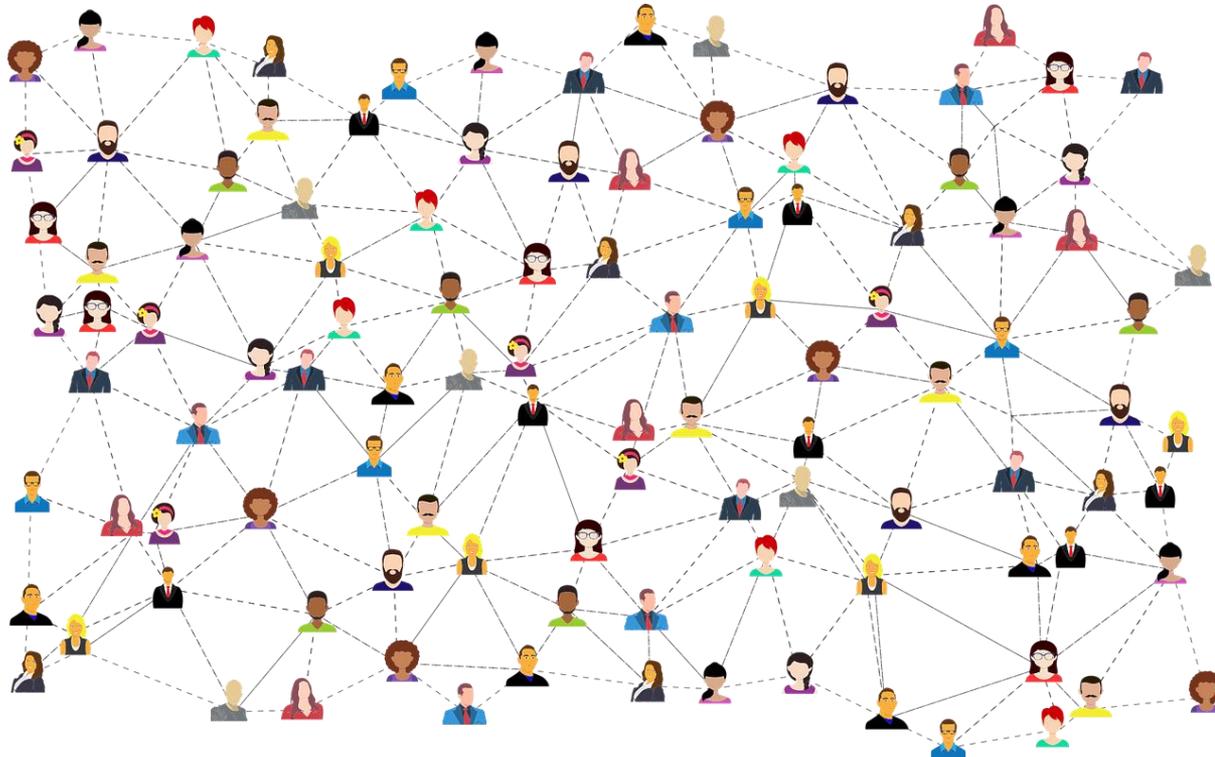
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# Overview #EPBstandards



[rehva.eu](http://rehva.eu)

Sub-Modules	M3 Heating	M4 Cooling	M5 Ventilation	M6 Humidification	M7 Dehumidification	M8 Domestic Hot Water	M9 Lighting	M10 Building Autom. & Controls	M11 Photovoltaic, Wind
General	EN 15316-1	EN ISO 16798-9	EN 16798-3	EN 16798-3	EN 16798-3	EN 15316-1	EN 15193-1	EN 15232-1	
Needs						EN 12831-3	EN 15193-1		
Maximum Load and Power	EN ISO 52016-1 EN 12831-1	EN ISO 52016-1		EN ISO 52016-1	EN ISO 52016-1	EN 12831-3			
Ways to Express Energy Performance	EN 15316-1	EN ISO 16798-9	EN 16798-3	EN 16798-3	EN 16798-3	EN 15316-1	EN 15193-1	EN 15232-1	
Emission & Control	EN 15316-2 EN 15500-1 EN 12098-1 EN 12098-3 EN 12098-5	EN 15316-2 EN 15500-1	EN 16798-7 EN 15500-1	EN 16798-5-1 EN 16798-5-2	EN 16798-5-1 EN 16798-5-2			EN 15232-1	
Distribution & Control	EN 15316-3 EN 12098-1 EN 12098-3 EN 12098-5	EN 15316-3	EN 16798-5-1 EN 16798-5-2			EN 15316-3		EN 15232-1	
Storage & Control	EN 15316-5 EN 12098-1 EN 12098-3 EN 12098-5	EN 16798-15				EN 15316-5 EN 15316-4-3		EN 15232-1	
Generation & Control	EN 12098-1 EN 12098-3 EN 12098-5 EN 15316-4-1 EN 15316-4-2 EN 15316-4-3 EN 15316-4-4 EN 15316-4-5 EN 15316-4-8	EN 16798-13 EN 15316-4-2 EN 15316-4-5	EN 16798-5-1 EN 16798-5-2	EN 16798-5-1 EN 16798-5-2	EN 16798-5-1 EN 16798-5-2	EN 15316-4-1 EN 15316-4-2 EN 15316-4-3 EN 15316-4-4 EN 15316-4-5		EN 15232-1	EN 15316-4-3 EN 15316-4-4 EN 15316-4-5 EN 15316-4-10
Load Dispatching & Operating Conditions	EN 15316-1	EN ISO 16798-9						EN 15232-1	
Measured Energy Performance	EN 15378-3					EN 15378-3	EN 15193-1	EN 15232-1	
Inspection	EN 15378-1	EN 16798-17	EN 16798-17	EN 16798-17	EN 16798-17	EN 15378-1	EN 15193-1	EN 16946-1	
BMS								EN 16947-1	



# Overview #EPBstandards



[epb.center](http://epb.center)

## EPB General

Frequently asked questions, highlights, documents,  
... on the set of EPB standards as a whole

## M1 Overarching

Frequently asked questions, highlights, overview of  
EPB standards and technical reports, tools and tips,  
...

## M2 Building as such

Frequently asked questions, highlights, overview of  
EPB standards and technical reports, tools and tips,  
...

## M3 Heating systems

Frequently asked questions, highlights, overview of  
EPB standards and technical reports, tools and tips,  
...

## M4 Cooling systems

Frequently asked questions, highlights, overview of  
EPB standards and technical reports, tools and tips,  
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## M5 Ventilation systems

Frequently asked questions, highlights, overview of  
EPB standards and technical reports, tools and tips,  
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## M8 Domestic hot water systems

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## M9 Lighting

Frequently asked questions, highlights, overview of  
EPB standards and technical reports, tools and tips,  
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## M10 Building automation and control

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# #EPBstandards Explained



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## EPB Standards Explained

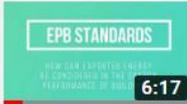
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### Series of webinars on the EPB standards!

A [series of webinars](#) on the EPB standards is organized throughout 2020 by BUILD UP in cooperation with EPB Center's experts under the scope of the Service Contract with EU DG ENER.

The 1<sup>st</sup> webinar was held 4<sup>th</sup> February 2020, on "Guidance and examples for the EPB standards' flexibility".

[Read more](#) about how the set of EPB standards combine a harmonized approach with room for tailored national or regional choices.

Or watch and listen to the [short webinar's presentations and discussion!](#)

The 2<sup>nd</sup> webinar is organized on **Thu 19<sup>th</sup> March 2020 (12h00-13h30)** on "EPB standards overview: why, how, what !"

[Read more and register here!](#)

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# #EPBstandards webinar series

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WEBINAR

**How to use the outputs of the EPB assessments in regulation:**  
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16th April | 12.00H

**BUILD UP** The European Portal For Energy Efficiency in Buildings

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Webinar series: Energy Performance of Buildings standards (EN/ISO) supporting the implementation of EPBD  
This webinar will take place on the 16th April, 12.00 to 13.30.  
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# #EPBstandards tailored services

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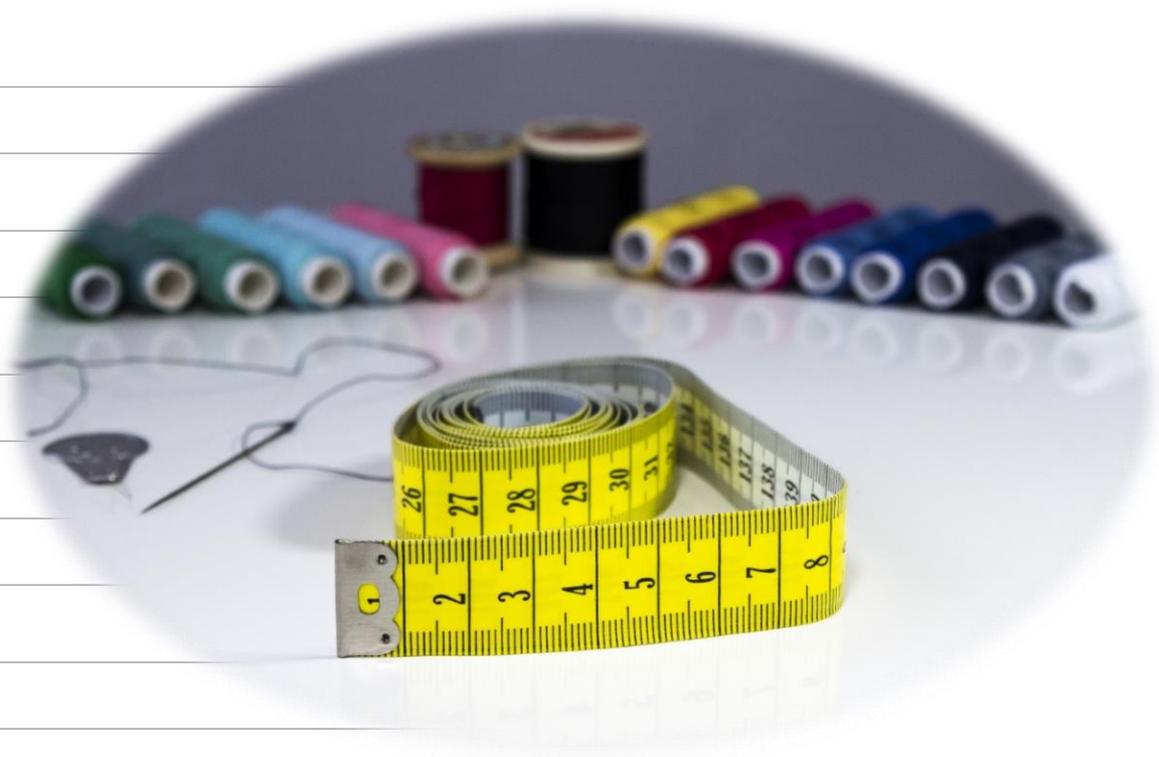
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**Thank you!**

*EPB Center is also 'available' for specific services requested by individual or clusters of stakeholders*

More information on the set of EPB standards:

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Contact: [info@epb.center](mailto:info@epb.center)



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