



# U-CERT

User-Centred Energy Performance  
Assessment and Certification

Supported by U-CERT's Deliverable D3.1

# Towards a converged EPB calculation methodology using the set of EPB standards



## U-CERT

User-Centred Energy Performance  
Assessment and Certification

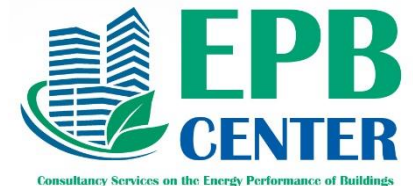


---

**EPB Center roadshow**  
March 2022

---

**Dick van Dijk**  
[dick.vandijk@epb.center](mailto:dick.vandijk@epb.center)



U-CERT project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement number 839937. The European Union is not liable for any use that may be made of the information contained in this document, which is merely representing the authors' view.

# U-CERT EPB calculation methodology

A proposal for a Europe-wide converged calculation methodology to assess the overall energy performance of buildings

- For information (EP Certificates)
- For benchmarking and checking compliance with minimum EP requirements
- Using the set of (CEN and ISO) EPB standards
- With a converged set of National Annexes to these standards



# Content

- Introduction
- The set of CEN and ISO EPB standards
  - Introduction
  - Selection for overall EP calculation
- What are the National Annexes to the EPB standards
  - Introduction
  - Analysis
  - Examples
- Conclusions

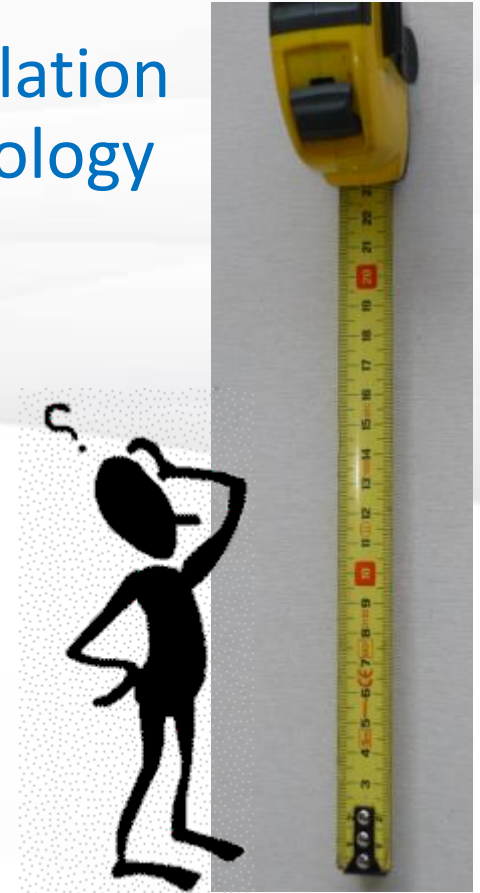
# Why important to converge?

- + Definitions
  - + Calculation method
  - + (assumed) outdoor and indoor conditions
- EP calculation methodology

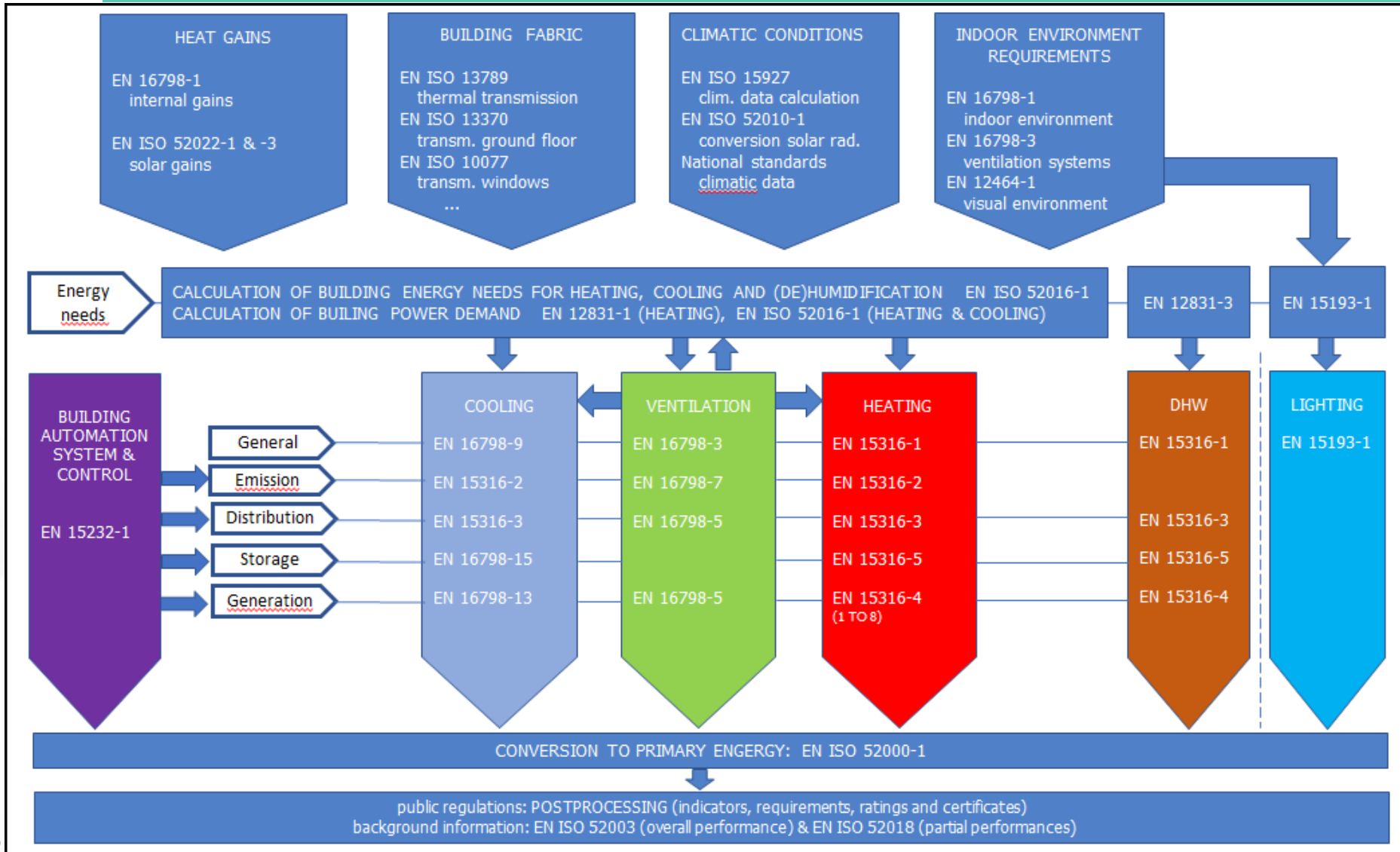
= EP value (kWh/m<sup>2</sup>) *But what does it mean?*

→ Need benchmarks / reference values  
*to give meaning* to the EP value

- **Different methodology = different meaning**
- *Differences are o.k., if conversion possible  
e.g. climatic data, prim.energy weighting factors*



# Set of CEN and ISO EPB standards



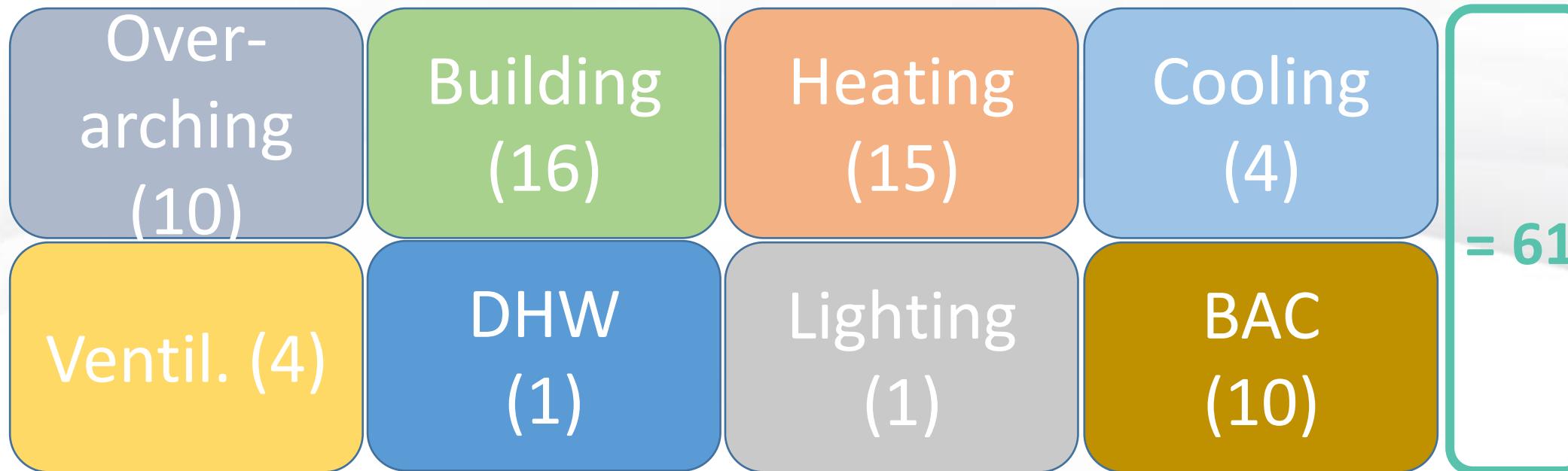
- Comprises a large number of documents
- But not all needed for EP calculation

➔ Next slides:

1. Modular approach
2. Different themes
3. Different applications

# Modular approach

Thanks to the adoption of a modular approach, the different topics can be clearly distinguished



# Themes

- (EP) Calculation procedures (36)
- Pre-processing: indoor and outdoor conditions (3)
- Post-processing: EP indicators, requirements or ratings (2)
- (EP) Measurement procedures (1)
- Building, system or component design procedures (11)
- Inspection procedures (4)
- Other (4)

= 41



## Further selection

- General application

= 16

- Special application (technologies, situations)

- Can often be simplified, without major impact on the overall EP

= 6

- 'Final' selection: **10 EPB standards**

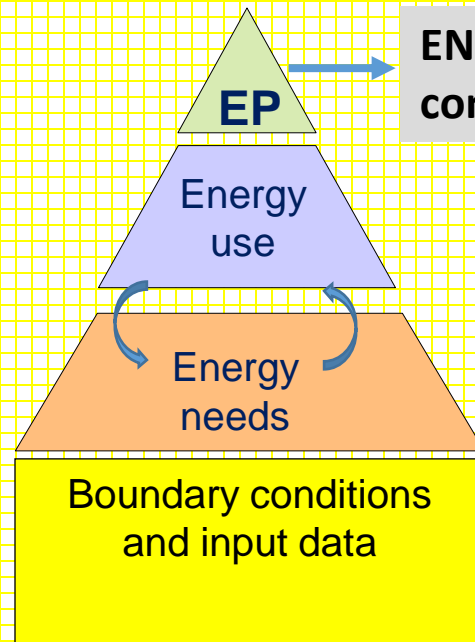
= 10

### Disclaimer:

*This final selection is -for a part- arbitrary & depending on the situation*

# Overall EPB calculation. Main EPB standards

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

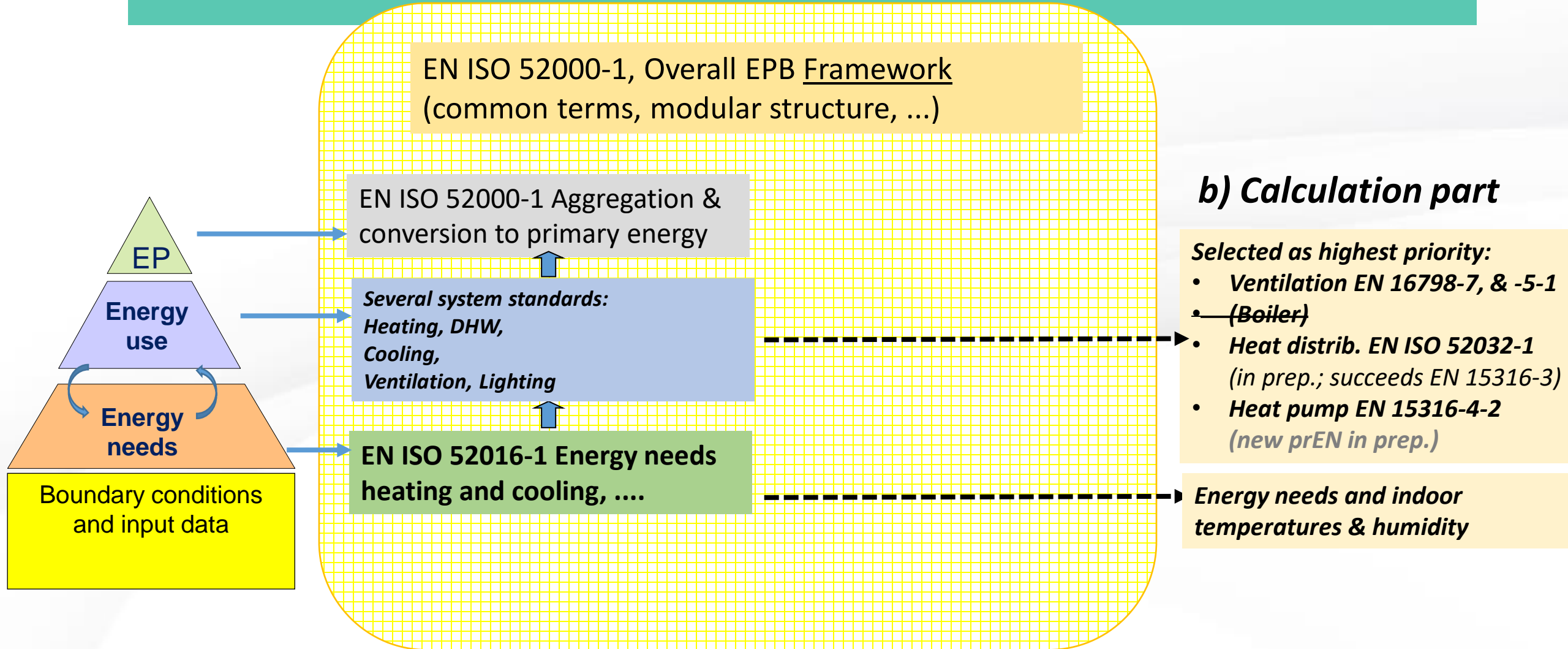


**EN ISO 52000-1 Aggregation &  
conversion to primary energy**

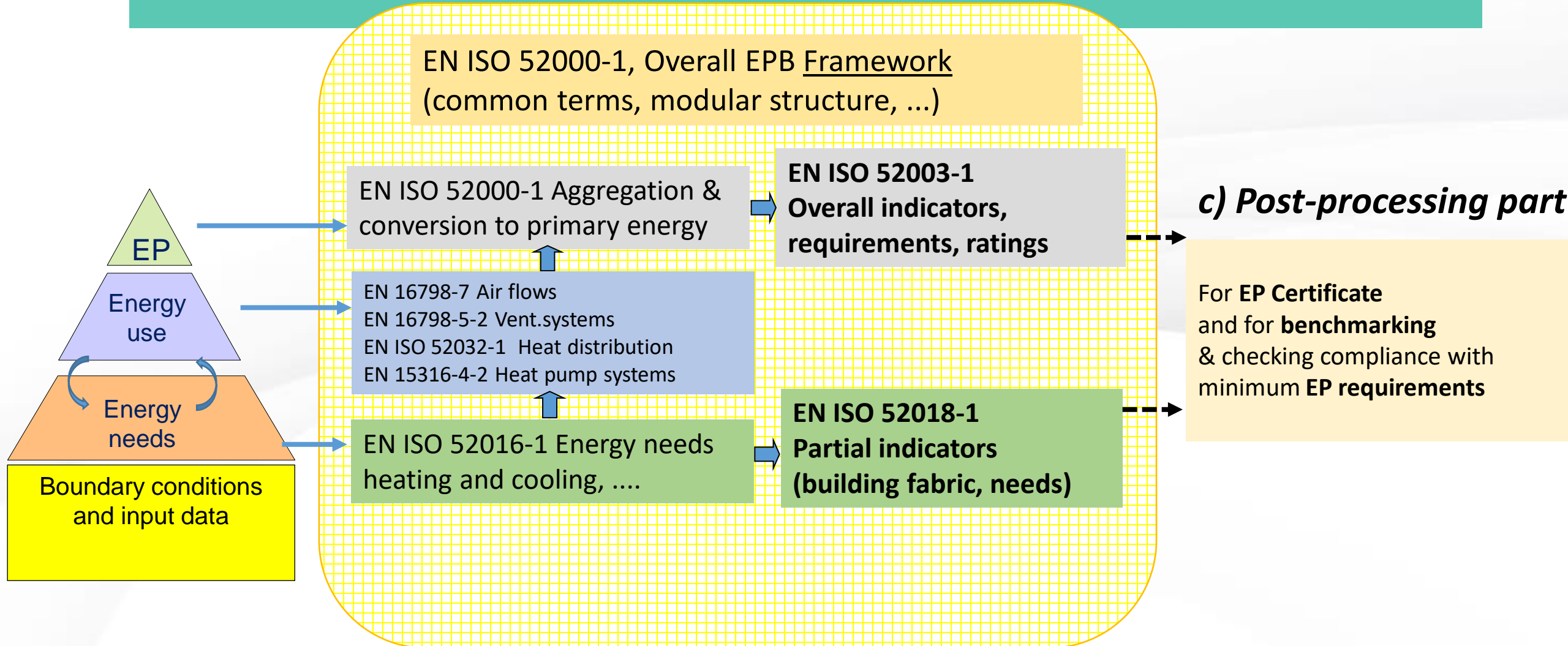
***a) Overarching part***

***EN ISO 52000-1:  
The “Alpha and Omega”  
of the EPB calculation  
procedures:  
Framework  
Final aggregation and  
conversion***

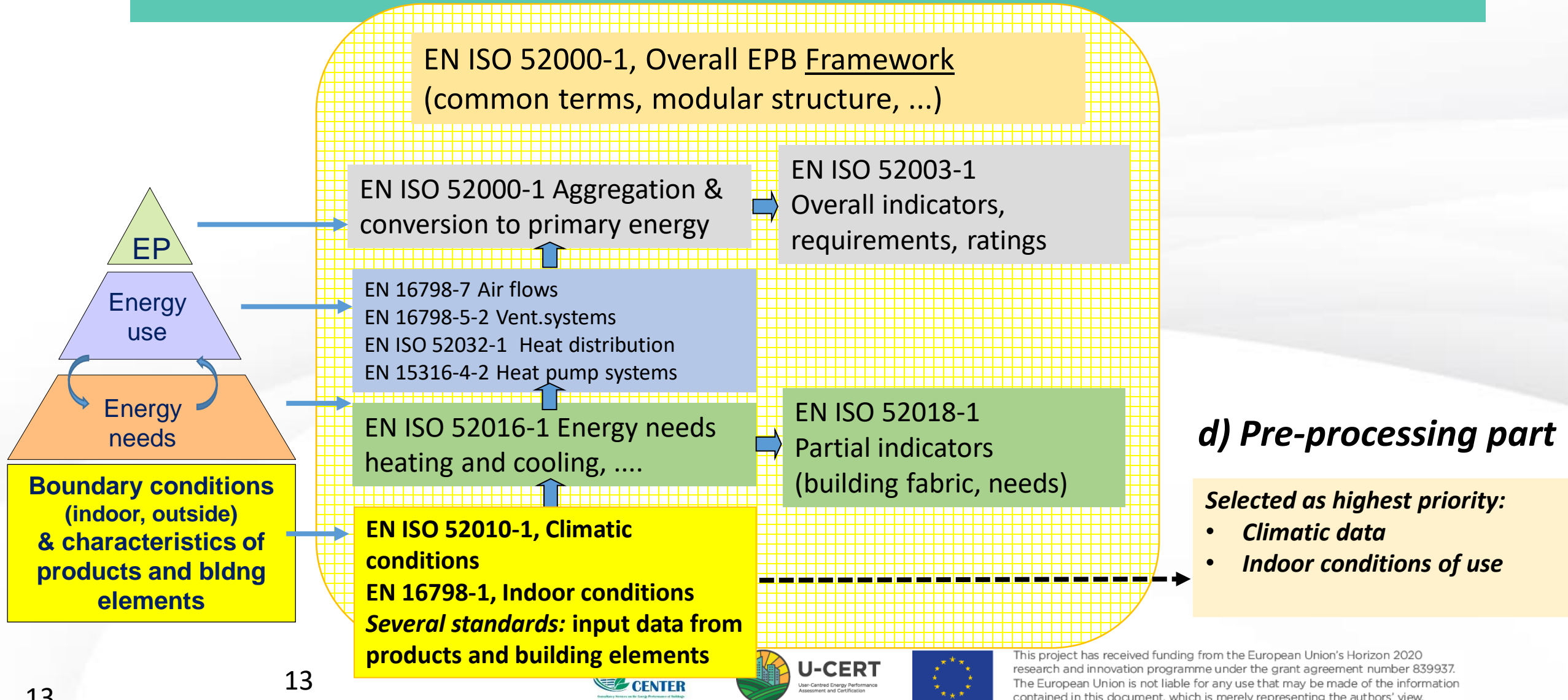
# Overall EPB calculation. Main EPB standards



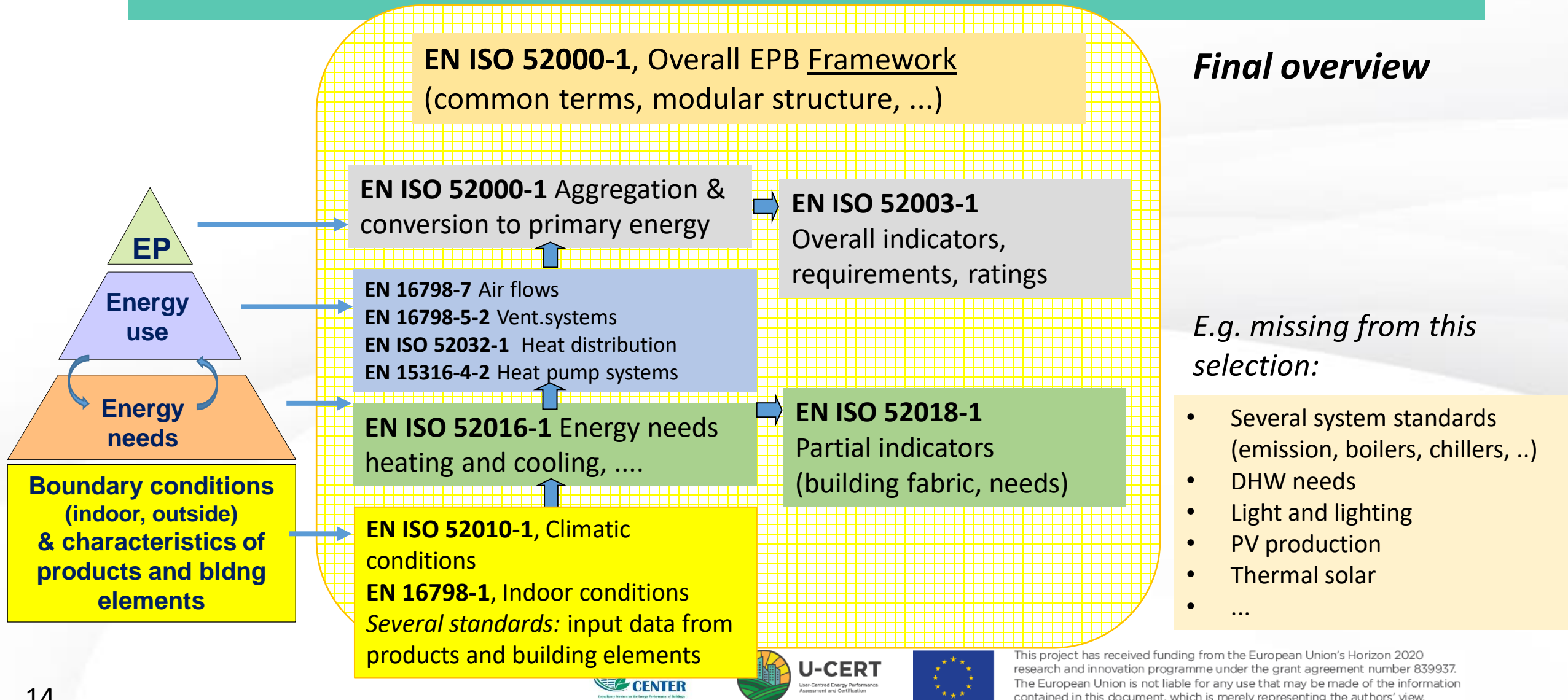
# Overall EPB calculation. Main EPB standards



# Overall EPB calculation. Main EPB standards



# Overall EPB calculation. Main EPB standards



## EPB standards selected → work done?

- No! Each EPB standard allows for specific national choices
  - Template in Normative **Annex A** of each EPB standard
  - Informative default choices in **Annex B** of each EPB standard
  - National choices
    - in **National Annex** (annexed to the standard), *or*
    - in **National Datasheet** (the same, as N.A., but as separate document (e.g. in Building regulations))















More info: <https://epb.center/epb-standards/implementation/national-annexes/>

# Set of EPB standards: not “*One size fits all*”

Many options to **tailor** to national/regional situation

*To account for differences in climate, culture and building tradition, building typologies, policy and legal frameworks*

*See EPB Center website:  
recording of webinar 1 (Feb. 4,  
2020)*

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



# Example of a table in Annex A and Annex B of an EPB standard

- From **EN ISO 52016-1:2017**, *Energy performance of buildings — Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads — Part 1: Calculation procedures*

**Table A.7 — Choice between calculations with thermally coupled or uncoupled thermal zones**  
(see 6.4.7)

Application	..... <sup>b</sup>	
Description	Choice <sup>a</sup>	
Thermally uncoupled calculations	Yes/No	
Thermally coupled calculations	Yes/No	
Both methods are allowed	Yes/No	
<sup>a</sup> Only one Yes per column possible. <sup>b</sup> Add more columns if needed to differentiate between applications (e.g. building category, buildings, etc.). Note the link with the choice in Table A.9		

**Table B.7 — Choice between calculations with thermally coupled or uncoupled thermal zones**  
(see 6.4.7)

Application	All applications
Description	Choice <sup>a</sup>
Thermally uncoupled calculations	Yes
Thermally coupled calculations	No
Both methods are allowed	No

- <sup>a</sup> Only one Yes per column possible.  
<sup>b</sup> Add more columns if needed to differentiate between applications (e.g. building category, buildings, etc.). Note the link with the choice in Table A.9

## Towards converged EPB calculation methodology using the set of EPB standards

These 10 selected EPB standards contain in total 238 choices (~ 238 tables)

Done for each table:

- ➔ a) Categorized: type of choice
- b) A specific choice proposed, specified and explained
- c) Links indicated with other tables of this set of EPB standards

# Categorization of all “Annex A” choices

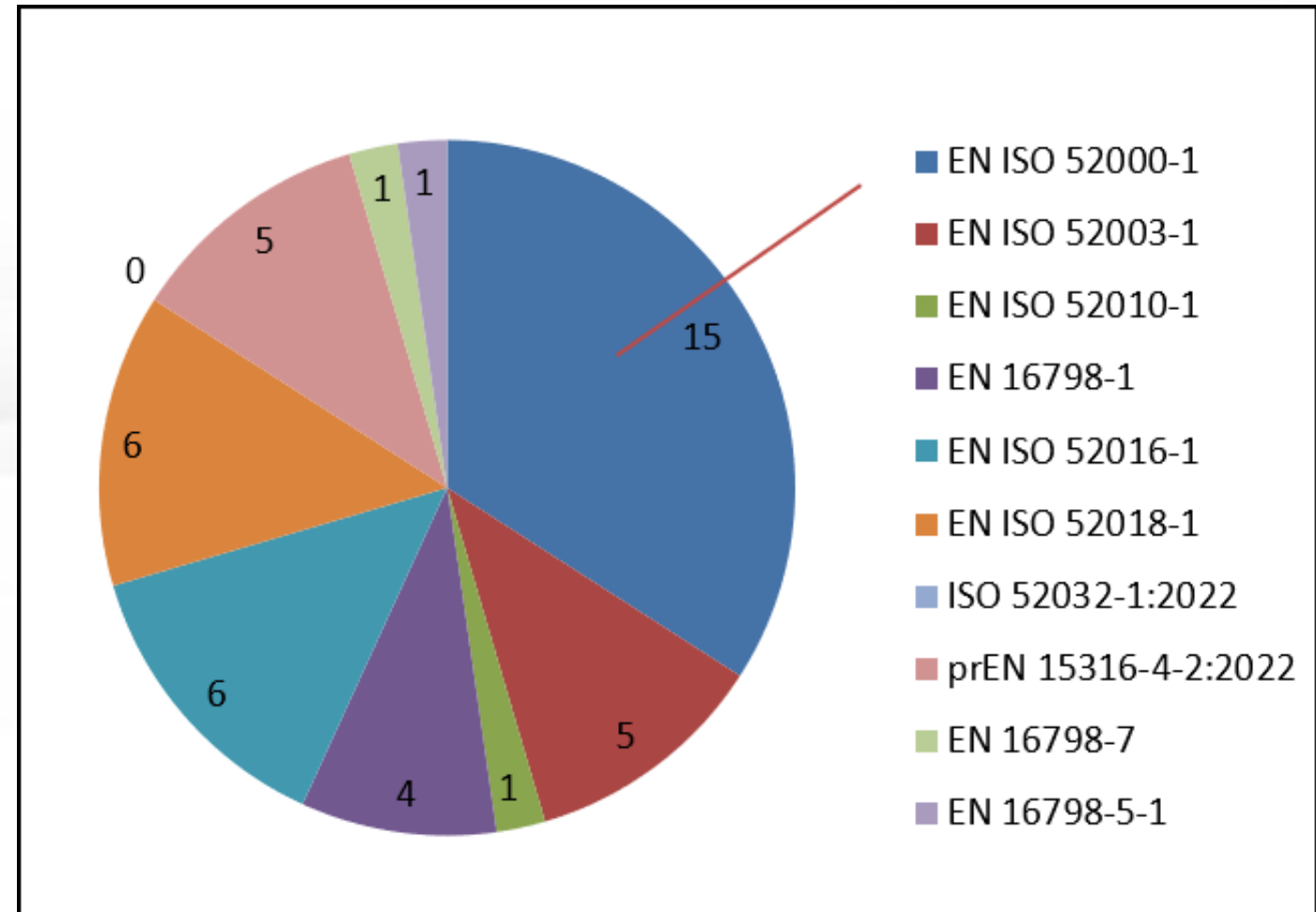
Relevant for  
calculated EPB

Type of choice *)		Explanation
A	Important factor for the calculated energy performance	incl. pre-processing (e.g. zoning) and/or indoor/outdoor conditions
B	Critical for calculation tool development	Significant impact on the configuration of software tool that is based on the calculation procedures
C	Less crucial detail for calculation methodology	incl. pre-processing (e.g. zoning) and/or indoor/outdoor conditions
D	Policy choice	
E	Categorization	of buildings, spaces, services, etc.
F	Post-processing	Indicators, rating, ..; indicators may also be important factor!
G	References to other (EPB) standards	If one or more EPB standards are replaced by other references it can have serious impact on the methodology
H	Measured energy performance	
I	Other	No (direct) impact on EP calculation methodology

\*) : More than one choice possible. But category A excludes C and vice versa. Categories E to I: only single choice

## Counting the “important choices”

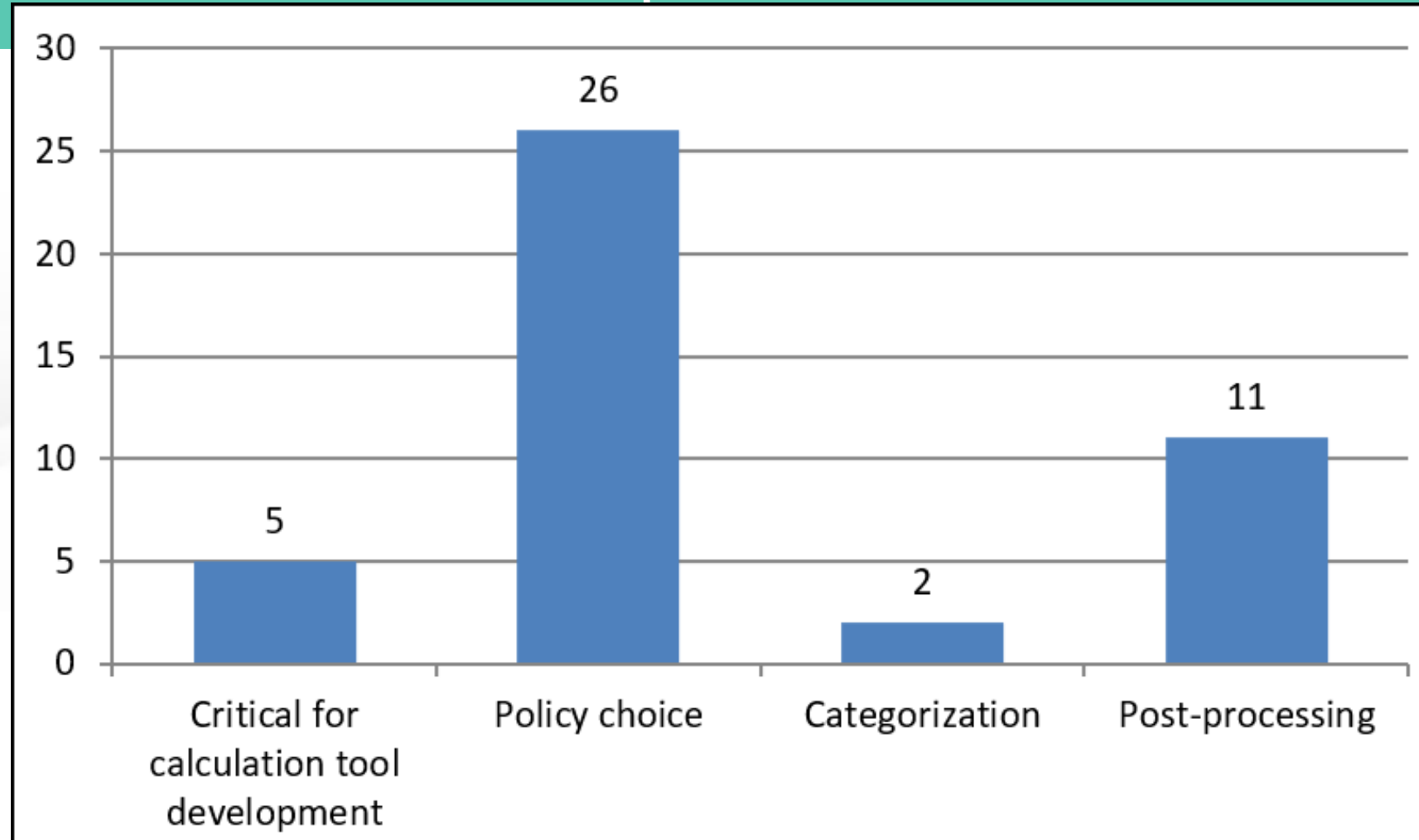
- For the 10 selected EPB standards together:
- 44 tables are categorized as “important choice for the EPB calculation”



# Further categorization of the 44 important choices

**Disclaimer:**  
*This categorization  
and selection  
inevitably contains  
subjective elements*

*(The numbers don't  
add up, because  
more than one type  
is possible)*



# Examples of the most important choices

## Pre-processing:

- Specification of **space categories**  
*e.g. office space, hotel or class room, resid....*
- Which **building services** in EP calculation  
*e.g. heating, cooling, ventilation, DHW, lighting*
- Specification of the useful (reference) floor area  
*e.g. occupants/m<sup>2</sup>, EP in kWh/m<sup>2</sup>*
- Specification of perimeter for the building & which energy flows are counted  
*e.g. what is on-site? What is counted as renewable energy, ..*

*Some choices are technical, others are policy related*

*Several choices are mutually related*

# Examples of the most important choices

## Pre-processing (*continued*):

- Principle of assumed or presence of system

### *U-CERT proposal:*

*Linked to next presentation.  
See D3.2 report for details*

- **For EP rating: assume** that all services are present and adequately sized to fulfil the needs  
→ calculated EP can be used to compare buildings, mutually and against benchmarks & EP requirements
- **For EP Certificate: take the actual presence** of systems. → if system is absent or undersized: calculated EP will be “realistic”, but at the cost of (thermal or other) comfort = **essential complementary information**

# Examples of the most important choices

## Conditions

- Climatic dataset \*)
- Conditions of use, per space category \*)

*\*) If kept different between countries:*

- *No direct comparison possible*
- *But output of EPB assessment can be converted*

## Processing (calculation procedures)

- Primary Energy and CO<sub>2</sub> weighting factors \*)

- **Hourly** or monthly calculation procedures

*See webinar 4 (May 26, 2020)*

- ~~• Matching factor of produced and used electricity (if monthly method)~~
- Dividing the building for the calculation into thermal zones
- Specific other technical choices with significant impact



# Examples of the most important choices

**Post-processing:**  *Subject of the next presentation! (U-CERT D3.2)*

- Choice if export of on-site produced electricity is rewarded in the overall energy performance ( $k_{\text{exp}}$  factor)
- Main EP indicator and other key overall EP features for indicators, indicator specifications
- Energy rating method (specification of EP label classes)
- Key partial EP features for indicators and indicator specifications

# Conclusions

- ✓ Most important EPB standards for the calculation of the overall energy performance of buildings selected
- ✓ From these: all 238 tables with national choices analysed and categorized. Important links between the choices in the tables presented
- ✓ For each of the 238 tables a proposal made for the choice, with explanation
- ✓ Some of the most important choices have been selected for this presentation

Result: U-CERT converged overall EPB calculation methodology based on the set of EPB standards

# References

- Published in August 2021. Final update expected mid 2022:
  - **Main report D3.1**, *Development of a converged set of national data sheets (towards a U-CERT calculation methodology using the set of EPB standards)*
  - **Annex 2** (*separate document*), Proposal for U-CERT converged set of national datasheets for the main EPB standards
  - **Spreadsheet** with categorized overview of all Annex A/B choices in 10 selected EPB standards

[About ▶](#)[EPB Standards ▶](#)[Support ▼](#)[EPB Center Services](#)[News ▶](#)[Contact](#)

## Support, consultancy and services on Energy Performance of Buildings Standards calculations and implementation

**EPB Center** - Your service center for information on the new set of **EPB standards**: the internationally harmonized energy performance of buildings (EPB) assessment and certification.

EPB Center works for the benefit of all stakeholders in the implementation of the **Energy Performance of Buildings (EPB) Standards** by acting as a dedicated consultancy and service center for the Energy Performance of Buildings (EPB) Standards development under the European Commission's (EC) Mandate M/480.

[Overview EPB standards](#)[Short videos](#)[Webinars](#)[Case Studies](#)[Documents](#)

*Visit the [www.EPB.Center](http://www.EPB.Center) for all information on the set of EPB standards, tools, webinars, short videos, Q&As, ...*

[Read more](#)<https://epb.center/support/>

# THANK YOU FOR YOUR ATTENTION!

[www.u-certproject.eu](http://www.u-certproject.eu)



U-CERT PROJECT



@cert\_u



U-Cert Project

**TNO**



**Atecyr**

**comfort  
consulting**



**EnEffect**



**HUYGEN**  
INGENIEURS & ADVISEURS



**ISSO**



**IVE**  
INSTITUTO VALENCIANO  
de la EDIFICACIÓN



**U-CERT**  
User-Centred Energy Performance  
Assessment and Certification

**REHVA**  
Federation of  
European Heating,  
Ventilation and  
Air Conditioning  
Associations

**TAL  
TECH**

**tipee**

**AICARR**  
Cultura e Tècnica per l'Energia Umana e Ambiente