EPB standard EN ISO 52003: How to put the EPB assessment outputs to intelligent use

Documents EN ISO 52003-1 & -2 describe the relation between the indicators to express the energy performances of buildings (EPB) and the EPB requirements and EPB ratings. These documents provide general insight to private prescribers and public regulators (and all stakeholders involved) on how to make best use of the outputs of the EPB assessment methods. This article gives a brief overview of these documents, which are in a final drafting stage.

Keywords: Energy Performance of Buildings, EPB, EPB regulations, EPB requirements, EPB rating, EPB certificate, EPB indicators, EPB features, EPB tailoring.

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Following CEN Mandate M/480 [1], a comprehensive series of European (CEN) and international (CEN & ISO) standards is at an advanced stage of development. The series is called the "set of EPB standards" and aims at the international harmonization of the methodology for the assessment of the overall and partial energy performances of buildings. The first issue of the 2015 REHVA journal [2] gave a broad overview of these standards. This article provides further information on 1 of them, namely draft EN ISO 52003, which is being developed in ISO/TC 163/WG 4 (joint working group of ISO/TC 163 with ISO/TC 205) and which is due to replace EN 15217:2007 and ISO 16343:2013.

Draft standard EN ISO 52003-1 [3], together with its accompanying draft technical report CEN ISO/TR 52003-2 [4], gives guidance on the main uses that can be made of the outputs (EPB indicators) of the EPB assessment standards, in particular their use for EPB requirements and EPB ratings. This can be called the "post processing" of the results of the EPB assessment. The standard itself (i.e. part 1) lists and clarifies the different steps that still need to be taken in order to make full use of the EPB methodologies. The technical report (i.e. part 2) provides background information supporting these tasks. Due to its overarching nature, EN ISO 52003 is closely linked to the EPB overarching standard, EN ISO 52000-1 [5].

By describing explicitly the different policy making aspects, all parties involved can gain a better understanding of the issues at hand, thus facilitating the policy making process. In the case of public regulations, the parties include not only the regulators themselves, but also all stakeholders involved in the policy development, notably diverse organizations representing citizens, designers, industry, craftsmen, etc.

Overview of the document

Figure 1 shows the relations between different EPB aspects that may be part of the post-processing. (The numbers refer to the paragraphs in the standard.) EPB indicators are the output provided by the EPB assessment standards. Two main uses of these variables are the setting of requirements and the judgment of how well/poor they perform, i.e. the rating. All this information can be included in an EPB certificate.

For certain EPB indicators, a specific, but important aspect is the tailoring of a requirement or of a rating reference to each individual building (dashed lines). This tailoring is a function of the building's category (dwelling, office, etc.), location (determining the outdoor climate), size, etc. For many outputs such variable (rather than constant) requirement/reference values are essential. E.g. in order to arrive at a technical and economical strictness of requirements that is comparable for all individual projects. To this end some new ('post-processing') calculations may need to be defined (see below), beyond what is already specified in the EPB standards. Sometimes this leads to the definition of a new, derived indicator, notably by taking the ratio of the original indicator and the tailored reference.

EPB requirements

Setting EPB requirements involves several aspects:

- defining the different objectives that are pursued: e.g. a healthy and comfortable indoor environment, energy efficiency, fabric and equipment preservation, etc.;
- carefully selecting an adequate mix of EPB indicators for which requirements are set: usually a judicious combination of overall energy performances (e.g. with and without renewable energy) and partial energy performances (e.g. on the fabric, or the systems) is needed to fully achieve all objectives;
- choosing the appropriate type of quantitative requirement for each of the selected indicators, notably whether a constant value or a variable value (see "tailoring" below);
- determining the actual strictness and its evolution over time.

Each of these aspects is discussed in detail in draft EN ISO 52003.

EPB rating

A numeric indicator for an EPB feature (as produced by the EPB assessment methods) does not yet automatically reveal the energetic quality of the building with respect to that EPB feature. The EPB indicator needs to be compared to one or more reference values in order to judge (rate) the good or poor performance of the EPB feature under consideration.

A typical reference value is for instance a representative value for new buildings or a representative value for the average building stock.

Energy (performance) rating is the evaluation of the energy performance against one or more reference values, which may include ranking on a continuous or discrete scale.

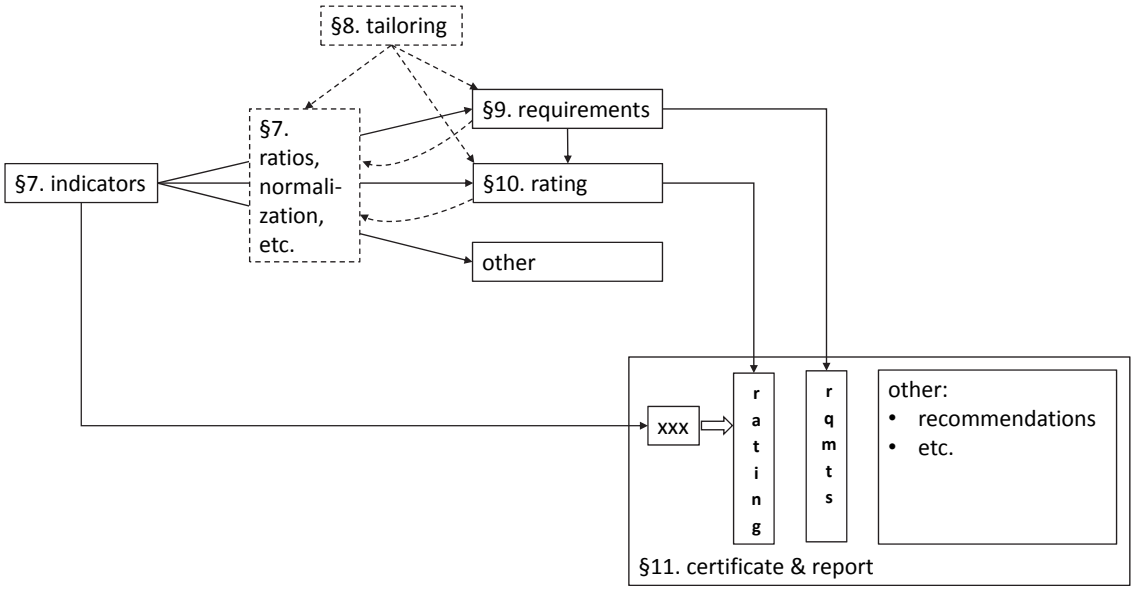

Figure 1. Schematic overview of the relations between various EPB aspects.

Figure 2 shows an example of a rating (scale) based on one reference in position of energy class D (n_{ref}=4). Upper boundaries of energy classes A to G (n=1 to 7) are presented as the ratio to this reference.

Figure 3 shows an example of a subsequent graphical representation for an energy label.

Tailoring for requirements and for ratings

For several important EPB indicators (e.g. overall energy performances, heating and cooling needs, mean thermal transmittance of the thermal envelope) the numeric value that corresponds to the technical and economic optimum often varies strongly from 1 construction project to another, depending on function, size, shape, etc.

Similarly, for such indicators the numeric gradation between "good" and "bad" in a rating can also vary strongly from 1 project to another.

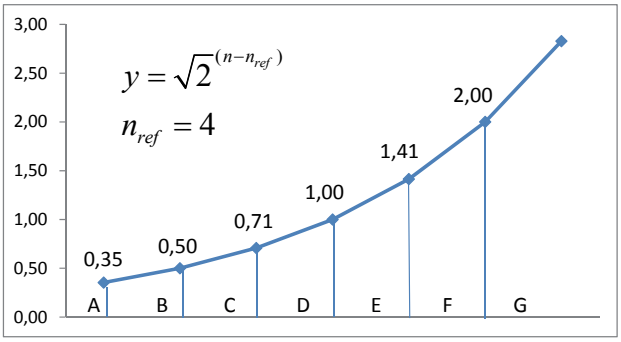

Figure 2. Example of an energy performance rating (scale).

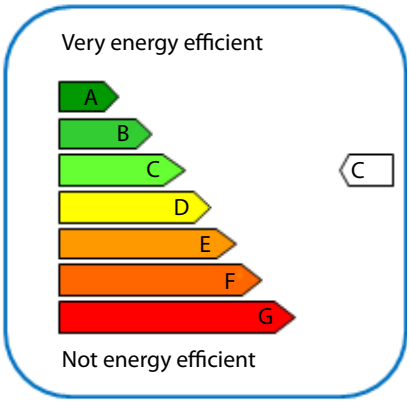

Figure 3. Example of graphical representation of the energy performance classes for an energy label.

In order to treat all buildings in the same manner (e.g. reflecting the same technical and economic strictness), it is for these indicators thus of crucial importance to use variable value requirements or references that take into account all relevant specific features of each individual building. This is called tailoring. The 2 practical manners for such tailoring that are found in practice are:

- the notional reference building approach
- the formula approach

Although both approaches may appear very different at first sight, they actually result in identical, or very similar, results if the same technical starting assumptions are taken. They can thus both serve the purpose well.

Figure 4 illustrates on the basis of some 200 real dwelling shapes (each individual cross) how for a given set of technical measures (level of thermal insulation, type of boiler, degree of airtightness, etc.) the numeric value of an overall energy performance indicator per useful floor area can strongly vary from one project to another. The x-axis is the ratio of the area of the envelope to the useful floor area.

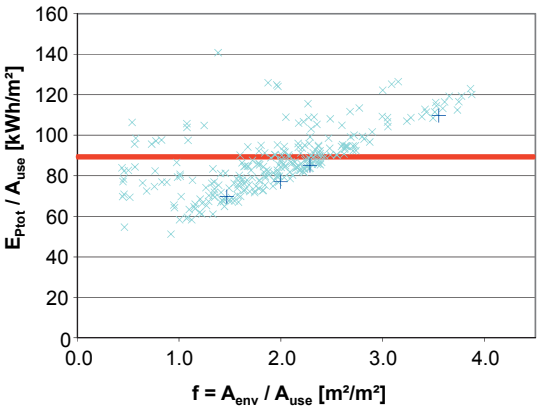

Figure 4. Example of the impact of a fixed (constant value) requirement versus a more appropriate variable value (tailored).

If the reference value that is used for rating and/or to set a requirement is a fixed value (in casu: requirement expressed as maximum value in kWh/m² floor area disregarding building shape or size: e.g. red horizontal line), then buildings with a relatively large envelope area[1] (compared to the floor area) would need a large

[1] I.e. to the left of the graph. For instance, small detached dwellings.

technological-economic effort to meet the requirement, while on the other hand buildings with a relatively small envelope area would need only a small technological-economic effort to meet the same requirement. A more appropriate reference for the rating and/or requirement takes into account this variation and determines project-specific, tailored quantitative requirements.

Conclusion

The new draft texts of EN ISO 52003 list explicitly the different actions that need to be taken into account and provide background information on various post-processing tasks (selecting EPB indicators for requirements and ratings, tailoring and certification). In doing so, they, first of all, provide support to the regulators. In addition, the texts inform all stakeholders, so, that these can engage in a productive dialogue with the regulators. In this manner, a well-considered regulation can be developed matching the sophistication of the actual EPB assessment methods. ■

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References

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[3] EN ISO 52003-1, Energy performance of buildings – Indicators, requirements, ratings and certification – Part 1: General aspects and application to the overall energy performance (in preparation; submission of FDIS to final ballot expected in 2016).

[4] CEN ISO/TR 52003-2, Energy performance of buildings – Indicators, requirements, ratings and certification – Part 2: Explanation and justification of ISO 52003-1 (in preparation; submission to Committee Approval expected in 2016).

[5] EN ISO 52000-1, Energy performance of buildings — Overarching EPB assessment – Part 1: General framework and procedures (in preparation; submission of FDIS to final ballot expected in 2016).