
Energijske lastnosti stavb - Postopek ekonomskega vrednotenja energijskih sistemov v stavbah - 2. del: Razlaga in utemeljitev EN 15459-1 - Modul M1-14

Energy performance of buildings - Economic evaluation procedure for energy systems in buildings - Part 2: Explanation and justification of EN 15459-1, Module M1-14

Heizungsanlagen und Wasserbasierte Kühlanlagen in Gebäuden - Energieeffizienz von Gebäuden - Teil 2: Begleitender TR zur EN 15459-1 (Wirtschaftlichkeitsberechnungen für Energieanlagen in Gebäuden)

Performance énergétique des bâtiments - Procédure d'évaluation économique des systèmes énergétiques des bâtiments - Partie 2: Explication et justification de l'EN 15459-1, Module M1-14

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Performance énergétique des bâtiments - Procédure
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Gebäuden - Energieeffizienz von Gebäuden - Teil 2:
Begleitender TR zur EN 15459-1
(Wirtschaftlichkeitsberechnungen für Energieanlagen
in Gebäuden)

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European foreword

This document (CEN/TR 15459-2:2017) has been prepared by Technical Committee CEN/TC 228 “Heating and cooling systems in buildings”, the secretariat of which is held by DIN.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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Introduction

The set of EPB standards, technical reports and supporting tools

In order to facilitate the necessary overall consistency and coherence, in terminology, approach, input/output relations and formats, for the whole set of EPB-standards, the following documents and tools are available:

- a) a document with basic principles to be followed in drafting EPB-standards: CEN/TS 16628:2014, Energy Performance of Buildings — Basic Principles for the set of EPB standards [1];
- b) a document with detailed technical rules to be followed in drafting EPB-standards; CEN/TS 16629:2014, Energy Performance of Buildings — Detailed Technical Rules for the set of EPB-standards [2];
- c) the detailed technical rules are the basis for the following tools:
 - 1) a common template for each EPB-standard, including specific drafting instructions for the relevant clauses;
 - 2) a common template for each technical report that accompanies an EPB standard or a cluster of EPB standards, including specific drafting instructions for the relevant clauses;
 - 3) a common template for the spreadsheet that accompanies each EPB standard, to demonstrate the correctness of the EPB calculation procedures.

Each EPB-standards follows the basic principles and the detailed technical rules and relates to the overarching EPB-standard, EN ISO 52000-1:2017.

One of the main purposes of the revision of the EPB-standards is to enable that laws and regulations directly refer to the EPB-standards and make compliance with them compulsory. This requires that the set of EPB-standards consists of a systematic, clear, comprehensive and unambiguous set of energy performance procedures. The number of options provided is kept as low as possible, taking into account national and regional differences in climate, culture and building tradition, policy and legal frameworks (subsidiarity principle). For each option, an informative default option is provided (Annex B).

Rationale behind the EPB technical reports

There is a risk that the purpose and limitations of the EPB standards will be misunderstood, unless the background and context to their contents – and the thinking behind them – is explained in some detail to readers of the standards. Consequently, various types of informative contents are recorded and made available for users to properly understand, apply and nationally or regionally implement the EPB standards.

If this explanation would have been attempted in the standards themselves, the result is likely to be confusing and cumbersome, especially if the standards are implemented or referenced in national or regional building codes.

Therefore each EPB standard is accompanied by an informative technical report, like this one, where all informative content is collected, to ensure a clear separation between normative and informative contents (see CEN/TS 16629 [2]):

- to avoid flooding and confusing the actual normative part with informative content,
- to reduce the page count of the actual standard, and
- to facilitate understanding of the set of EPB standards.

This was also one of the main recommendations from the European CENSE project [5] that laid the foundation for the preparation of the set of EPB standards.

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CEN/TR 15459-2:2017 (E)**1 Scope**

This technical report refers to standard EN 15459-1, module M1-14.

It contains information to support the correct understanding, use and national adaptation of standard EN 15459-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15459-1, *Energy performance of buildings — Economic evaluation procedure for energy systems in buildings — Part 1: Calculation procedures, Module M1-14*

EN 15603:2008, *Energy performance of buildings - Overall energy use and definition of energy ratings*

EN ISO 7345:1995, *Thermal insulation - Physical quantities and definitions (ISO 7345:1987)*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN ISO 7345:1995, EN 15603:2008, EN 15459-1 apply. (standards.iteh.ai)

4 Symbols and abbreviations

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4.1 Symbols

For the purposes of this Technical Report, the symbols given in EN 15603:2008, in EN 15459-1 apply.

4.2 Subscripts

For the purposes of this Technical Report, subscripts given in EN 15603:2008, in EN 15459-1 apply.

5 Information on the method

The method presented in this TR is based on the calculation of costs occurring during the life cycle of the building. The choice for the type and categories of the costs items are linked to their influence of the energy performance of the building.

Restriction for the categories of costs items shall be made available when this economic analysis applies to part of the building, restricted energy building systems or choice of different options.

The limitation of this economic analysis may be due to the collection of data (existing building). Choices for initial based on comparison of building, or average data shall be clearly stated.

Table 1 — Main stages of a building over its life cycle

Product stage			Construction process stage		Use stage			End of life stage				
A-1 Raw material supply	A-2 Transportation	A-3 Manufacturing	A-4 Transportation to construction site	A-5 On site construction processes	B-1 Use - installed products	C-1 Deconstruction	C-2 Transportation	C-3 Recycling/reuse	C-4 Disposal			
					B-2 Maintenance							
					B-3 Repair							
					B-4 Replacement							
					B-5 Refurbishment							
					B-6 Operational Energy use							
					B 6.1 Operational energy - heating							
					B 6.2 Operational energy - cooling							
					B 6.3 Operational energy - ventilation							
					B 6.4 Operational energy - hot water							
					B 6.5 Operational energy - lighting							
					B 6.6 Operational energy - automation and control							
					B 6.7 Operational water use							

NOTE Table 1 corresponds to the elementary life cycle costs as described in ISO 15686-5 [5] and environmental building performance (EN 15978 [5]).

6 Method description

6.1 Rationale

The input data are the values collected for the building.

For any data different aspects are considered:

- the list of cost items considered (see Table 2 for example);
- the quantification (e.g. energy use, number and type of boilers,...);
- the costs (energy, boilers, ...) due for acquisition, maintenance, duration between replacements, and cost evolution,...

Operating conditions are considered as constant during the duration of the calculation period.

Table 2 — Example of costs items to be defined

Global cost items		Applicable (Y/N)
Initial costs	Land acquisition (land acquisition, preparation, depollution,...)	
	Design (preparation, selection of teams, design,...)	
	Site Works (connections to networks, construction process and products acquisition,...)	
	Verification, commissioning (control, verification, certification, commissioning handover,...)	
	Other cost or incomes (taxes, insurances, subsidies,...)	
Operational costs	Energy, water	
	Maintenance, operation, repair and periodic controls	
	Services to users (cleaning, waste, janitors,...)	
	Refurbishment (adaptation to user's need, upgrading features)	
	Residual value (expected value of building and components at the end of the calculation period, value for sale)	

6.2 Time steps

Time step is typically 1 year.

The method could be used for shorter time step (month) with adaptation of the input data (rate evolution, lifetime,...).

6.3 Assumptions

Energy use, rates for prices evolution are constant over the calculation period.

NOTE Formulas could be adapted to propose variation of the evolution rates.

6.4 Data input

6.4.1 Economic data

The determination of the discount rate as well as other inflation rate shall be made on a national basis.

For long term perspective, the development may be based on the published trends provided by the European Commission. For related symbols and units, see Table 3.) This information are available on the following website: <https://ec.europa.eu/energy/en/topics/energy-strategy/2030-energy-strategy>.

Table 3 — Economical data of global cost

Description	Symbol	Unit
Calculation period	t_{TC}	Year
Discount rate (real interest rate)	RAT_{disc}	%
Evolution rate for products	RAT_{pr}	%
Evolution rate for human activities	RAT_{hu}	%
Evolution rate for services	RAT_{ser}	%
Evolution rate for energy 1	$RAT_{en,1}$	%
Evolution rate for water	RAT_w	%
Percentage for demolition cost_1	$RAT_{disp,1}$	%
Percentage for demolition cost_2	$RAT_{disp,2}$	%
Maintenance rate for products	RAT_{ma}	%

6.4.2 Energy costs data

The information on the energy used are based on EN 15603 (Table 4 illustrates such a principle for display of the costs per type of energy use).

Energy use can be expressed either with gross values either with specific unit. Values of energy use in Table 4 are expressed in kWh/m².