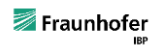


European Calculation Tools for Energy Efficient Buildings

Simon Wössner |



FraunhoferInstitut für Bauphysik IBP



1

Energy Efficiency is... a rather complex thing



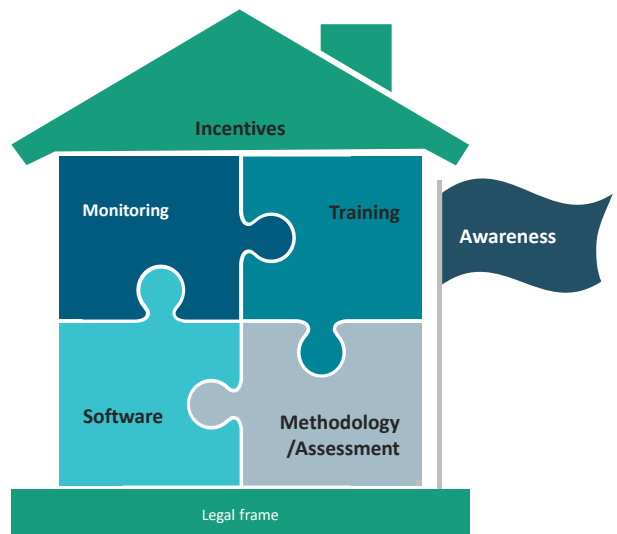
Affects us all and includes a lot of stakeholders and therefore depends on a solid and reliable structure



Coordinated and, above all, interlocking components form a reliable framework for assessing energy efficiency requirements.



National and international frameworks must be aligned! EPBD gives a good guidance on which direction to go.



2

Energy a rather

Affects depend

Coordinat framework

Nationa gives a

Project Options and browser

Navigation

Energy need

Energy efficiency certificate

Operation mode of the wizard for the technical systems

System selection

Energy performance certificate

Operation mode of the wizard for the technical systems

The wizard for technical systems can set up generators, units, distributions, pipes, pumps, storages etc. for heating, cooling, hot water and/or ventilation.

Only the wizard is used to define the technical systems. No details are shown.

The wizard is used to start and a refinement is possible or even required

The wizard is not used at all

Technical systems in building can be defined in three ways: (i) using HVAC wizard, (ii) using HVAC wizard to start with definition of system parameters in more detail, and (iii) detailed description of all systems (no use of HVAC wizard). These options are offered when starting the programme, but the choice made at the start can be changed when coming up to this screen.

HVAC system has to be updated

Pushing the apply button will delete all technical systems and create new technical systems according to the selections here.

In case that certain technical systems are defined in more detail and they are not in accordance with the previously selected options in the HVAC wizard mode, a warning dialog box appears requesting further action regarding HVAC system update. By pressing the Re-apply button all technical systems will be deleted and new technical systems will be created according to the selections here (in HVAC wizard). In case that defined technical systems are to be kept, then this warning message should be ignored and the button The wizard is not used at all should be pressed.

System selection

Using HVAC wizard is a simplified approach since the systems are automatically configured according to a small number of selected options referring to some basic information about systems and parts of the systems, such as heat generator, energy carrier, type of emissions, etc. Modelling of technical systems is checked, just compatibility. No this Results Help

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3

Energy Efficiency is... a rather complex thin

Affects us all and include depends on a solid and r

Coordinated and, above a framework for assessing e

National and internationa gives a good guidance on

1.1 Minimum energy performance values for residential buildings

Minimum energy performance values for residential buildings

es

Training

Awareness

Methodology /Assessment

#	Parameters	Reference value		
		Climate Zone I	Climate Zone II	Climate Zone III
Heat transfer coefficient				
1	U-Value: External walls, walls to the garage, walls to the attic	0,40 W/m²K	0,30 W/m²K	0,3 W/m²K
2	U-Value: Windows, balcony doors, roof windows, transparent façade elements	2,0 W/m²K	2,0 W/m²K	1,3 W/m²K
3	U-Value: Flat and pitched roofs above heat space, ceilings towards the attic	0,40 W/m²K	0,40 W/m²K	0,30 W/m²K
4	U-Value: Ceilings beyond external air, ceilings beyond garages	0,40 W/m²K	0,40 W/m²K	0,30 W/m²K
5	U-Value: Walls and ceilings towards the non-heated rooms, non-heated stairs of temperature above 0 °C, rooms that are occasionally used and areas of other purpose	0,50 W/m²K	0,30 W/m²K	0,30 W/m²K
6	U-Value: Walls to the ground, floors on the ground	0,50 W/m²K	0,50 W/m²K	0,5 W/m²K
7	U-Value: Exterior heated stairs, do			2,9 W/m²K
Solar thermal prop				
8	g-Value window			0,60
9	Fc in wintertime	1,00	1,00	1,00
10	Fc in summertime	0,40	0,40	0,40
Other parameters for the building fabric				
11	Thermal bridges	In accordance with recommended solutions		
12	Condition of building	Windows and facade walls in normal condition		

In force since July 2024 in Montenegro!

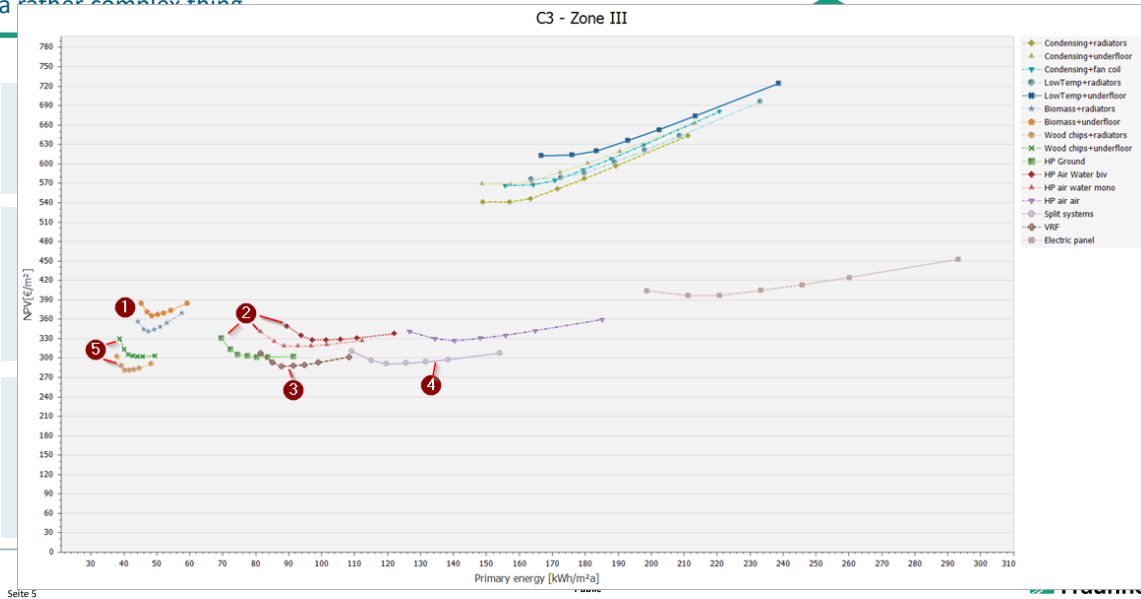
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Public

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4

Energy Efficiency is... a rather complex thing



5

Energy Efficiency is... a rather complex thing



6

Energy Efficiency is... a rather complex thing



Affects us all and includes a lot of stuff
depends on a solid and reliable structure



Coordinated and, above all, interlocking
framework for assessing energy efficiency



National and international framework
gives a good guidance on which direction



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7

Energy Efficiency is... a rather complex thing



Affects us all and includes a lot of stuff
depends on a solid and reliable structure



Coordinated and, above all, interlocking
framework for assessing energy efficiency



National and international framework
gives a good guidance on which direction

BUILDING ENERGY PERFORMANCE CERTIFICATE

Reference number of certificate: Expiration date: 28.10.31

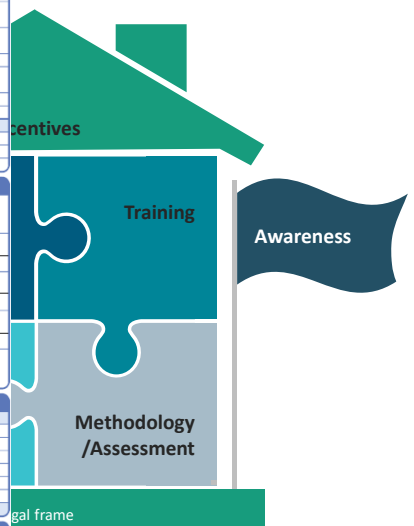
GENERAL INFORMATION ABOUT THE BUILDING			
Cadastral parcel:		Ul Bozane Vucinic 44	
Location / Address:		Ministry of Education	
Owner:		Ministry of Education	
Year of construction:		1948	
Type / Purpose of the building:		School	
Building part / Zone:		School and Gym	
Climate zone:		Zone I	
Building		New <input type="checkbox"/> Existing <input checked="" type="checkbox"/> Reconstructed <input type="checkbox"/>	
Gross floor area [m ²]	4402.61 m ²	Gross building volume [m ³]	20831.97 m ³
Useful floor area [m ²]	3818.72 m ²	Net building volume [m ³]	15518.69 m ³
Thermally conditioned [m ²]		Building shape factor [m ²]	0.36 1/m

INFORMATION ON ENERGY PERFORMANCE				
<div style="display: flex; justify-content: space-between;"> <div style="width: 20px; height: 20px; background-color: green; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; background-color: yellow; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; background-color: orange; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; background-color: red; border: 1px solid black;"></div> <div style="width: 20px; height: 20px; background-color: darkred; border: 1px solid black;"></div> </div>	Energy class of the building:	E		
	Primary energy per useful floor area thermally conditioned [kWh/m ² ·a]	129.82	Notional Building:	112.29
	Delivered energy per useful floor area thermally conditioned [kWh/m ² ·a]	105.76	Notional Building:	64.17
	Annual emission CO ₂ [kg CO ₂ /m ² ·a]	31.19	Notional Building:	31.44
	Share of renewable energy sources	6.13%		

ENERGY DEMAND OF THE BUILDING [kWh/m ² ·a]			
Type of energy demand	Energy need	Delivered energy	Primary energy
Heating	67.31	90.74	104.35
Cooling	7.05	2.25	7.05
Domestic hot water	0.72	1.37	1.58
Lighting	6.80	11.16	19.52
Ventilation	0.00	0.00	0.00
Auxiliary energy	0.00	0.25	0.44
TOTAL	81.88	105.76	129.82

INFORMATION ABOUT THE CERTIFICATE	
Authorized person:	Authorisation issued: 2018
Responsible qualified person:	No. of authorisation:
	Other qualified persons involved:

Date / Place: Signature:

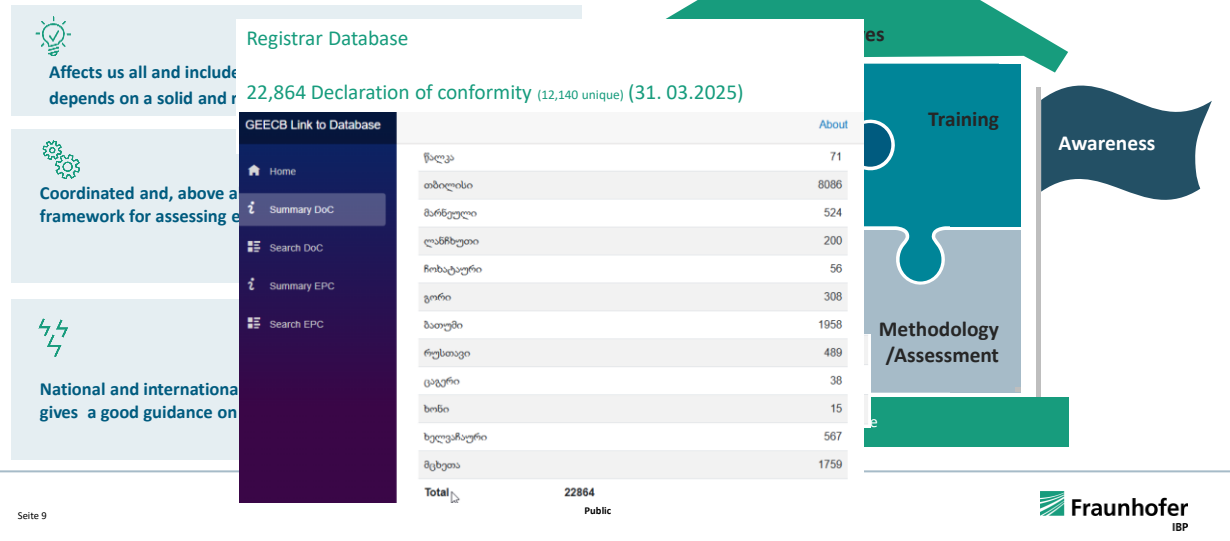


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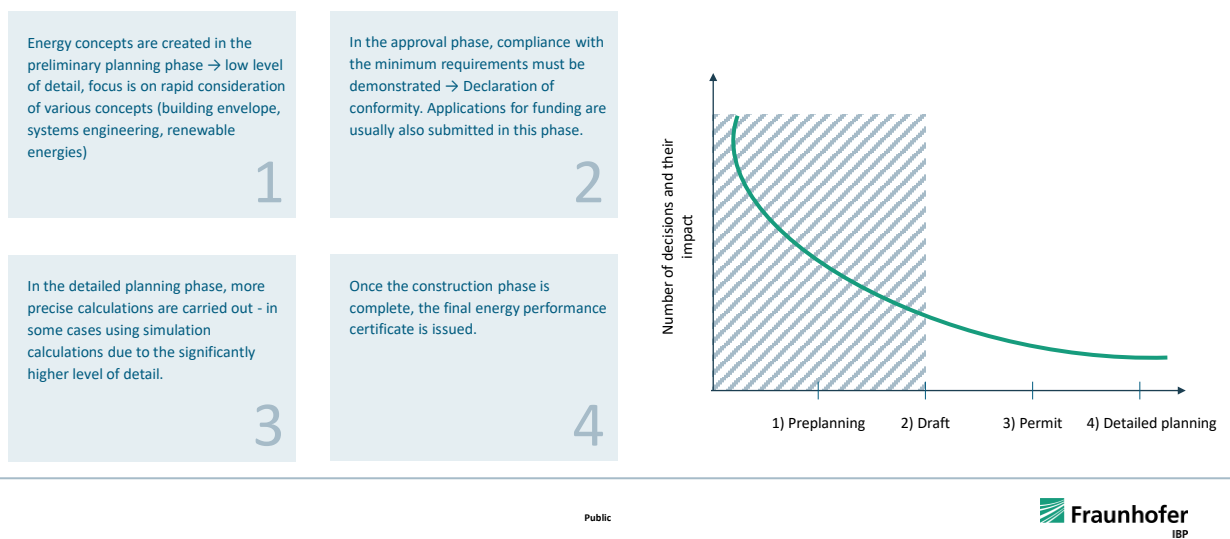
8

Energy Efficiency is... a rather complex thing



9

Energy Performance In BUILT Environment When are energy efficiency calculations carried out?



10

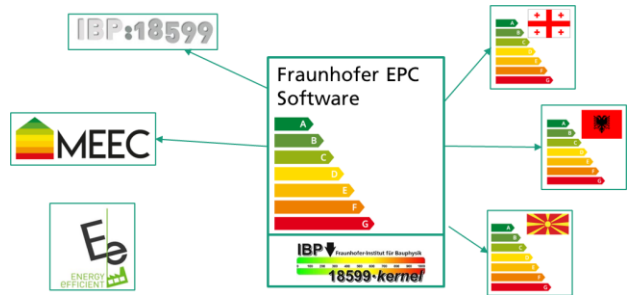
FraunhoferEPCSoftware

FraunhoferEPCSoftware presents national editions for energy auditors

Highly adapted products to the countries rules / regulations with an international approved calculation engine / methodology

Distributed without license fees to reduce barriers

Part of a solution set with software, support in EPBD implementation, cost optimal studies, trainings, ...



Calculation API

Calculation tools for energy demand calculation

Since 2005, the Fraunhofer IBP has been developing the "ibp18599kernel." This is a calculation library with a comprehensive implementation of DIN V 18599:2007 to 2024.

Certificates according to EnEV 2009 to GEG 2023 with automatic parameterization of the reference building, as well as according to the regulations of the KfW Efficiency Programs and the Federal Funding for Energy Efficient Buildings (BEG), is included.

Additions in the calculation kernel family 2023 with a pre-parameterization module and a module for simplified potential assessment for the BEG.

IBP 20 YEARS ANNIVERSARY

Fraunhofer-Institut für Bauphysik

18599-kernel

swagger

ibp18599kernelSimplifiedWeb

ibp18599kernelSimplified Show/Hide List Operations Expand Operations

POST	/api/ibp18599kernelSimplified/CalculatePureDINV18599	Calculates a building according to pure DIN V 18599
POST	/api/ibp18599kernelSimplified/CalculateGEG	Calculates a building according to current GEG
POST	/api/ibp18599kernelSimplified/CalculateBEG	Calculates a building according to current BEG
POST	/api/ibp18599kernelSimplified/CalculateEnergyForQNG	Calculates the energy results of a building according to current QNG

[BASE URL: , API VERSION: v1]

Quality assurance for software – EPC And LCA (QNG)

Gütegemeinschaft Bilanzierungswerkzeuge

Association of software companies developing EPC software for Germany based on DIN V 18599

Founded after public doubts on comparable calculation results of EPC software in 2010

Quality control scheme for EPC Software
Gütesiegel

EPC and LCA (QNG)



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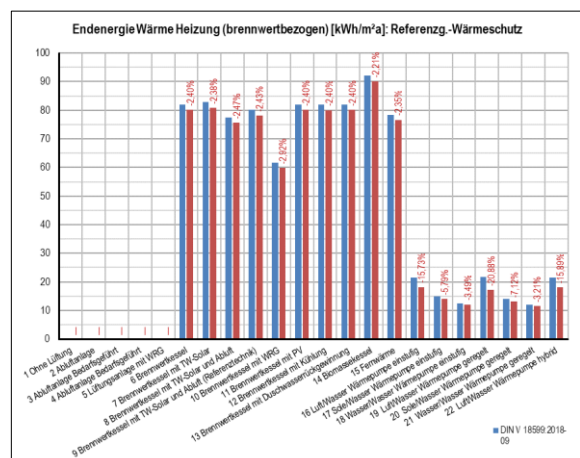
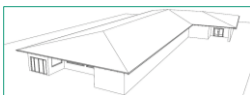
Public



13

Quality assurance for software – EPC And LCA (QNG)

Gütegemeinschaft Bilanzierungswerkzeuge



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Public



14

Energy Performance Certificate

The most important instrument for raising awareness of energy-efficient construction.

All buildings in the EU will gradually be issued with a certificate.

A strengthening of the role of energy performance certificates is foreseen in the upcoming EPBD amendment.

Other mechanisms also access the energy performance certificate -> EU Taxonomy Directive.

სერტიფიკატი

MINISTRY OF ECONOMY
AND SUSTAINABLE DEVELOPMENT
OF GEORGIA

გაბის გაცემის თარიღი:

სერტიფიკატის ნომერი:

ზოგადი ინფორმაცია შენობის შესახებ

საგუბანტრო კოდი: for the building part	
ფედერალური/მხარეთა/მუნიციპალიტეტის	
შესაყობი:	
Type of EPC	Energy Performance Certificate
Date of project certificate	
Date of EPC	
შენობის ტიპი	
მშენებლობის თარიღი	
შენობის ჩამოყალიბება	
კომპლექტის ნომერი	
მფლობელი	
სერტიფიკატის გამომცემი	

ინფორმაცია ენერგოეფექტურობაზე

A

B

C

D

E

F

G

შენობის ენერგოეფექტურობის კლასი:	
პირველადი ენერგია თბოქონიდან კონდიციონირებად სისტემებში ფაქტობრივ სტანდარტს	საწიფში შენობა
მეორეხარისხიანი ენერგია თბოქონიდან კონდიციონირებად სისტემებში ფაქტობრივ სტანდარტს	საწიფში შენობა
CO ₂ -ის ფაქტობრივი ემისია (გვ CO ₂ /წმ)	საწიფში შენობა
განმარტებული ენერგიის შეყობის წილი	

ინფორმაცია სერტიფიკატის შესახებ

ფედერალური/მხარეთა/მუნიციპალიტეტის	
საქონლის მფლობელი	
გამომცემი/გამომცემის კვალი/ფაქტობრივი	

Energy Performance Certificate

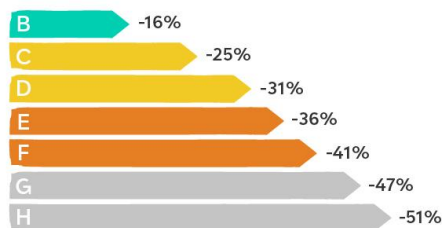
The most i
energy-eff

price reductions according to energy efficiency class for real estate in rural areas

All building
certificate.

A strength
certificates

Other medical certificate



Quelle: Auswertung der bei ImmoScout24 inserierten Wohnungen und Einfamilienhäuser zum Kauf (Bestand, älter als zwei Jahre) in Q1 2023

[illegible]

Energy Efficiency is... achievable



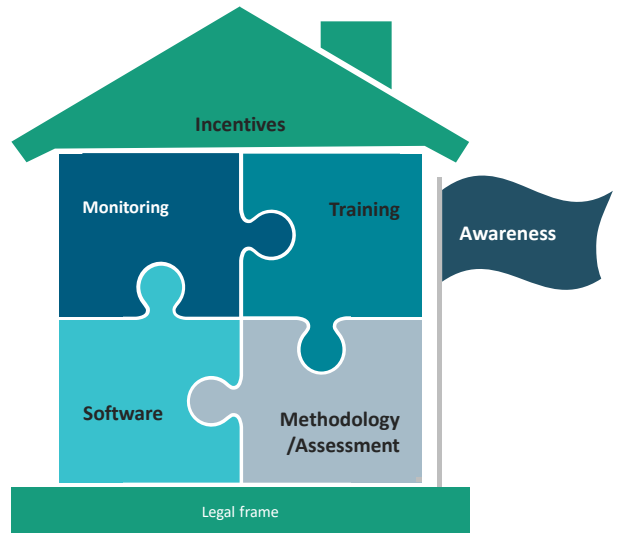
We have 20+ years of experience not only in implementing a calculation standard computationally but also in understanding it, especially in its whole not just in the formulas itself!



We have the skills and experience to identify solutions, but also problems in calculations, present them clearly, and present meaningful solutions.



We understand the customers through our experience and can develop well – tailored solutions.



Contact

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