EnerPHit Retrofit Plan

#BEZUG!

Co-funded by the Intelligent Energy Europe Programme of the European Union

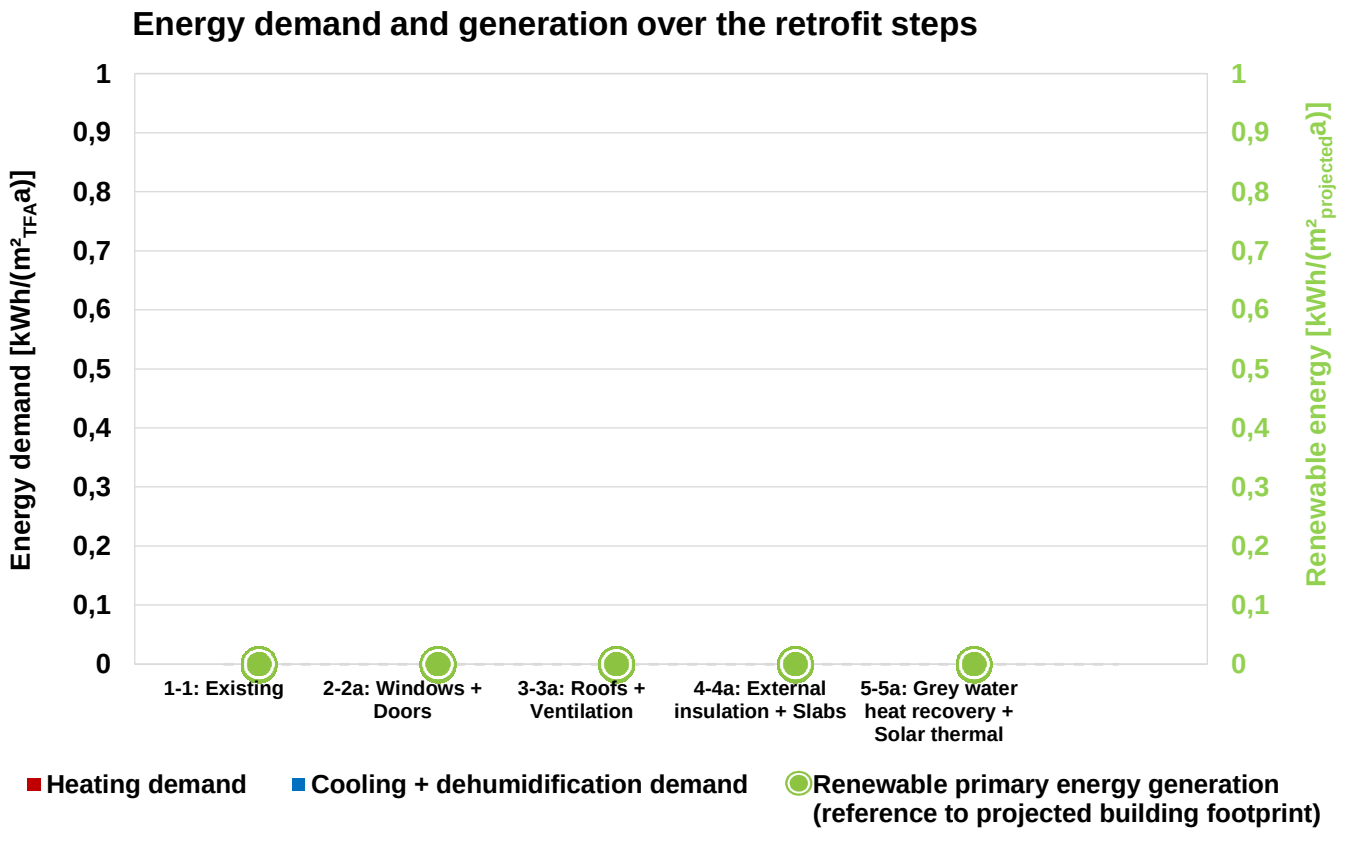
Object:	**#BEZUG!**		
	#BEZUG!		
	#BEZUG!	#BEZUG!	
	#BEZUG!		#BEZUG!
	#BEZUG!		
Climate data set:	#BEZUG!		
Climate zone:	#BEZUG!	Altitude of location:	#BEZUG!

Owner:	**#BEZUG!**		
	#BEZUG!		
	#BEZUG!	#BEZUG!	
	#BEZUG!		#BEZUG!

Energy consulting:	**#BEZUG!**		
	#BEZUG!		
	#BEZUG!	#BEZUG!	
	#BEZUG!		#BEZUG!

Pre-Certification:	**#BEZUG!**		
	#BEZUG!		
	#BEZUG!	#BEZUG!	
	#BEZUG!		#BEZUG!

Year of construction:	#BEZUG!	Interior temp. winter [°C]:	#BEZUG!	Interior temp. summer [°C]:	#BEZUG!
No. of dwelling units:	#BEZUG!	Treated floor area:	#BEZUG!	No. of occupants	#BEZUG!



I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

First name	Last name	Signature

Company	Issued (date)	City

, 0.1.1900

Dear building owner,

in the next few years you intend to modernise your building and to improve stepwise its level of thermal protection. This "EnerPHit Retrofit Plan" will help you to make the right decisions at each step.

EnerPHit Standard

In the case of refurbishments of existing buildings, it is not always possible to fully achieve the Passive House Standard with reasonable effort. The reasons for this lie e.g. in the unavoidable thermal bridges due to existing basement walls. For such buildings, the Passive House Institute has developed the EnerPHit Standard. With the use of Passive House components, EnerPHit retrofitted buildings offer almost all the advantages of a Passive House building with optimum cost-effectiveness at the same time:

• Comfortable living with uniformly warm walls, floors and windows
• Draughts, condensation and mould growth are no longer a problem
• Permanent supply of fresh air with a pleasant temperature
• Independence from energy price fluctuations
• Financial profits from the very first year on due to up to 90 % reduced heating costs
• Climate protection due to decreased CO2 emissions of the same scale

Most buildings are modernised in a step-by-step way when the respective building component needs to be renewed. Advantage can be taken of such opportunities to carry out future-oriented improvements to the thermal protection of the building. For example, if the façade already needs to be renewed anyway, the extra effort for thermal protection of the exterior wall to the Passive House quality at the same time will be manageable. Nevertheless, many interdependencies exist between individual energy efficiency measures, so that a good standard of thermal protection can only be achieved cost-effectively if an overall concept is prepared for the entire building prior to the first modernisation step. With the modernisation route planner, such an overall concept will be worked out for you by your Passive House Designer or energy consultant. This offers you the following advantages:

• Preparing for future steps already with today's measures will save costs on the whole and will ensure an optimal final outcome.
• An excellent final outcome can only be achieved if each individual step is implemented with the appropriate quality (EnerPHit-Standard).
• Once the overall concept has been prepared, it is available for every further step and thus facilitates the planning process (you don't have to start from the beginning every time).
• The energy demand is stated for each step.
• The approximate time points for upcoming refurbishment measures are stated in the general plan. This serves as a valuable aid for personal finance planning.

additional quality assurance. If the examination shows that the EnerPHit Standard will be achieved with the implementation of all planned measures, then the first step can be carried out. After this a preliminary EnerPHit certificate can then be issued for the building. If quality assurance is continued accordingly for each step, then the full EnerPHit certificate will be issued for the building upon completion of the last step. A preliminary certificate increases the value of your building because its potential is clearly demonstrated. It also increases the credibility of the refurbishment concept in the context of talks with the bank e.g. because the achievable cost saving is available in a reliably calculated way. Apart from that, you can demonstrate to the outside world that you are committed to climate protection.

I wish you every success with your retrofit project!

()

Scheduler

##

#BEZUG!

Retrofit steps:													1	2	3		4		5					
Assemblies	**Last renewal**	**1950**	**1955**	**1960**	**1965**	**1970**	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2015**	**2016**	**2017**	**2018**	**2025**	**2026**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
Facade (rendered)	**1980**																								
Pitched roof covering	**1980**																								
Ceiling under attic	**1980**																								
Exterior door	**1995**																								
Ceiling under attic	**1980**															X									
Garage door	**1995**																								
Windows	**1995**														(X)	X									
Shutters	**1995**														(X)	X									
Slab covering	**1980**																								
Boiler	**2012**																								
Ventilation	**1995**																								
Solar thermal system	**2030**																								
Airtightn. test: X, Leakage search: (X)																									

	Initial condition		Main-tenance		Extensive Repairs
X	Retrofit dates		Smaller Repairs		Immediate replaceme

Overview of measures

####

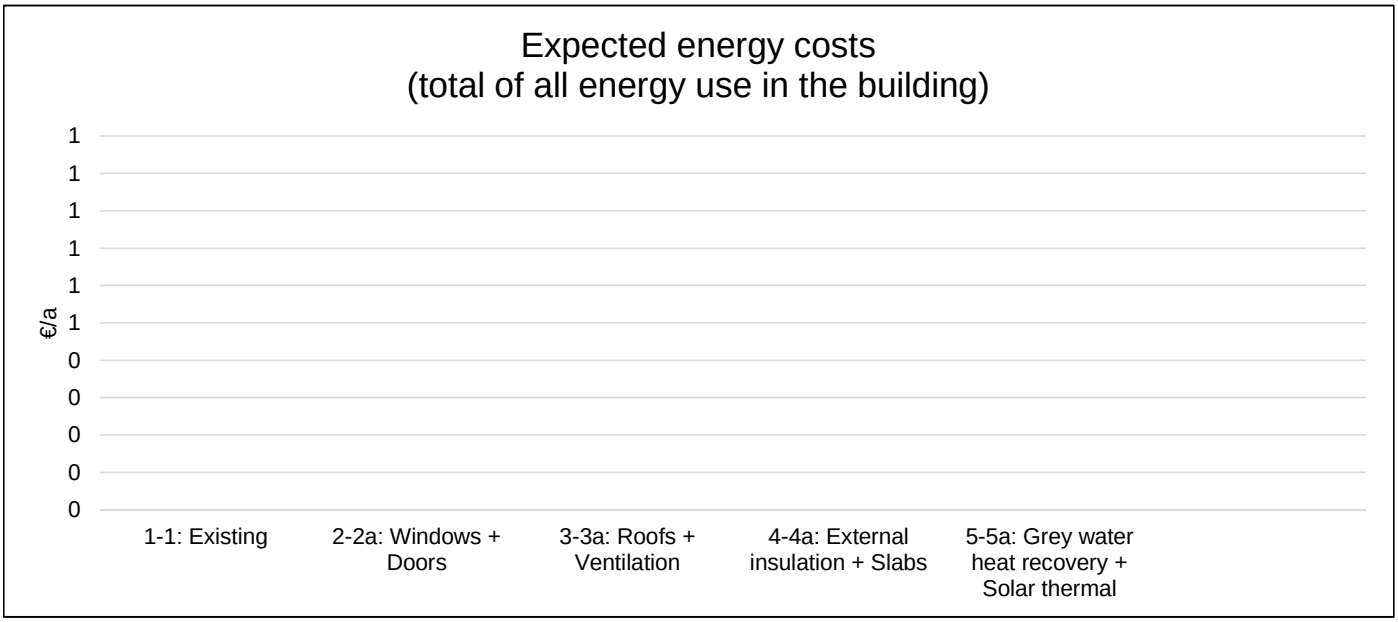
#BEZUG!

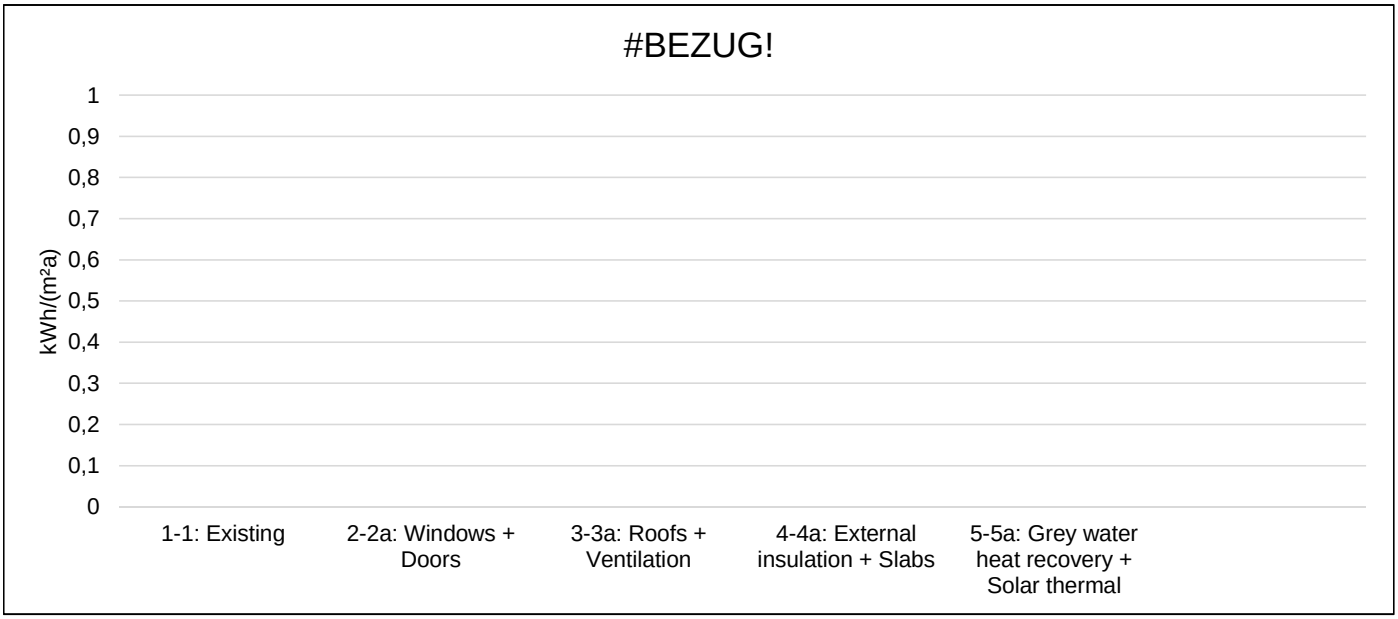
Retrofit step No.		1-1: Existing	2-2a: Windows + Doors	3-3a: Roofs + Ventilation	4-4a: External insulation + Slabs	5-5a: Grey water heat recovery + Solar thermal		Criteria	Alternative criteria
Year		2015	2016	2016	2025	2030			
Measures									
Occasion ("anyway measure")	a		Replacement of windows, entry door and shutters	Replacement of roof covering	Renewal and Paint of external render	Replacement of DHW distribution			
Energy-saving measure			Replacement to EnerPHit quality	Ceiling airtightness and insulation, Garage roof sarking insulation	EIFS including connection to roof and windows	Grey water heat recovery + Solar thermal panels connected to gas boiler			
Occasion ("anyway measure")	b		Paint garage door	Replacement of ventilation nozzles and ventilator, replacement of attic trap door					
Energy-saving measure			Garage door replaced by glazed window-doors	Installation of mvhr unit and supply ducts, new attic trap door	Insulation under screed for garage slabs				
Occasion ("anyway measure")	c								
Energy-saving measure									
Occasion ("anyway measure")	d								
energy-saving measure									
Occasion ("anyway measure")	e								
energy-saving measure									
Occasion ("anyway measure")	f								
energy-saving measure									
Occasion ("anyway measure")	g								
energy-saving measure									
Occasion ("anyway measure")	h								
energy-saving measure									
Component characteristics									
Wall to ambient air, ext. insulation (U-value)	[W/(m²K)]								
Roof (U-value)	[W/(m²K)]								
Building envelope to ambient (U value)	[W/(m²K)]							####	-
Wall to ground, ext. insulation (U-value)	[W/(m²K)]								
Basement ceiling / floor slab (U-value)	[W/(m²K)]								
Building envelope to ground (U-value)	[W/(m²K)]							####	-
Wall, int. insulation to ambient air (U-Value)	[W/(m²K)]							####	-
Wall, int. insulation to ground (U-Value)	[W/(m²K)]							####	-
Flat roof (solar reflection index, SRI)	[W/(m²K)]							####	-
Inclined and vertical external surface (SRI)	[W/(m²K)]							####	-
Windows / doors ($U_{installed}$)	[W/(m²K)]							####	-
Windows ($U_{W,installed}$)	[W/(m²K)]							####	-
Windows ($U_{W,installed}$)	[W/(m²K)]							####	-
Glazing (g-value)	[]							####	-
Glazing/sun protection (max. solar load)	[kWh/(m²a)]							####	-
Ventilation (effective heat recovery efficiency)	[%]							####	-
Ventilation (effective humidity recovery efficiency)	[%]							####	-
Airchange at press. test n_{50}	[1/h]							####	-
Building characteristics									
Heating demand	[kWh/(m²a)]							####	####
Heating load	[W/m²]							####	####
Cooling + dehumidification demand	[kWh/(m²a)]							####	####
Cooling load	[kWh/(m²a)]							####	####
Frequency of overheating (> 25 °C)	[%]							####	-
Frequency of exc. high humidity (> 12 g/kg)	[%]							####	-
Non-renewable primary energy (PE demand)	[kWh/(m²a)]							####	-
Renewable primary energy (PER demand)	[kWh/(m²a)]							####	####
Renewable primary energy generation (reference to projected building footprint)	[kWh/(m²a)]							####	####
#BEZUG!									
Annual energy-related costs									
Energy-related invest. (interest+repayment)	[€/year]								
Expected energy costs (total of all energy use in the building)	[€/year]								
Total costs	**[€/year]**								

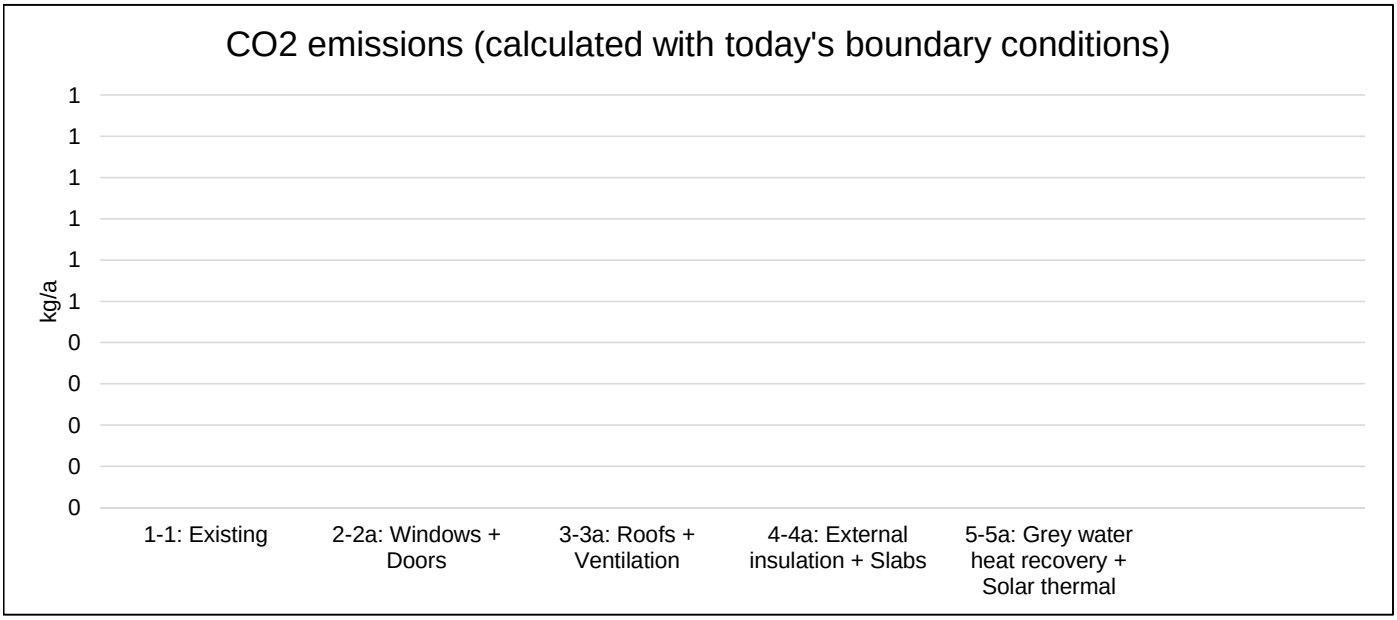
Diagrams

#BEZUG!

#BEZUG!







Investment and maintenance costs

#BEZUG!

##

	Retrofit step No.	1-1: Existing	2-2a: Windows + Doors	3-3a: Roofs + Ventilation	4-4a: External insulation + Slabs	5-5a: Grey water heat recovery + Solar thermal	
	Year	2015	2016	2016	2025	2030	
a	**Occasion ("anyway measure")**		**Replacement of windows, entry door and shutters**	**Replacement of roof covering**	**Renewal and Paint of external render**	**Replacement of DHW distribution**	
	Investment costs		**7.600 €**	**6.400 €**	**4.800 €**	**2.000 €**	
	Maintenance costs						
	Energy-saving measure		**Replacement to EnerPHit quality**	**Ceiling airtightness and insulation, Garage roof sarking insulation**	**EIFS including connection to roof and windows**	**Grey water heat recovery + Solar thermal panels**	
	Investment costs		**25.378 €**	**31.193 €**	**35.606 €**	**22.000 €**	
	Financial support (present value)						
	Maintenance costs					**50 €**	
	Service life [years]		**20**	**20**	**20**	**20**	
	Invest. costs (energy related)	0 €	17.778 €	24.793 €	30.806 €	20.000 €	0 €
	Maintenance costs (energy related)	0 €	0 €	0 €	0 €	50 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
b	**Occasion ("anyway measure")**		**Paint garage door**	**Replacement of ventilation nozzles and ventilator, replacement of attic trap door**			
	Investment costs		**140 €**	**430 €**			
	Maintenance costs						
	Energy-saving measure		**Garage door replaced by glazed window-doors**	**Installation of mvhr unit and supply ducts, new attic trap door**	**Insulation under screed for garage slabs**		
	Investment costs		**6.172 €**	**17.400 €**	**3.323 €**		
	Financial support (present value)						
	Maintenance costs			**100 €**			
	Service life [years]		**20**	**20**	**20**		
	Invest. costs (energy related)	0 €	6.032 €	16.970 €	3.323 €	0 €	0 €
	Maintenance costs (energy related)	0 €	0 €	100 €	0 €	0 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
c	**Occasion ("anyway measure")**						
	Investment costs						
	Maintenance costs						
	Energy-saving measure						
	Investment costs						
	Financial support (present value)						
	Maintenance costs						
	Service life [years]						
	Invest. costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Maintenance costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
d	**Occasion ("anyway measure")**						
	Investment costs						
	Maintenance costs						
	Energy-saving measure						
	Investment costs						
	Financial support (present value)						
	Maintenance costs						
	Service life [years]						
	Invest. costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Maintenance costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
e	**Occasion ("anyway measure")**						
	Investment costs						
	Maintenance costs						
	Energy-saving measure						
	Investment costs						
	Financial support (present value)						
	Maintenance costs						
	Service life [years]						
	Invest. costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Maintenance costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
f	**Occasion ("anyway measure")**						
	Investment costs						
	Maintenance costs						
	Energy-saving measure						
	Investment costs						
	Financial support (present value)						
	Maintenance costs						
	Service life [years]						
	Invest. costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Maintenance costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
g	**Occasion ("anyway measure")**						
	Investment costs						
	Maintenance costs						
	Energy-saving measure						
	Investment costs						
	Financial support (present value)						
	Maintenance costs						
	Service life [years]						
	Invest. costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Maintenance costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
h	**Occasion ("anyway measure")**						
	Investment costs						
	Maintenance costs						
	Energy-saving measure						
	Investment costs						
	Financial support (present value)						
	Maintenance costs						
	Service life [years]						
	Invest. costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Maintenance costs (energy related)	0 €	0 €	0 €	0 €	0 €	0 €
	Present value factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity factor (service life)	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Annuity (total)	0 €	0 €	0 €	0 €	0 €	0 €
	Annuity (energy related only)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
	Total invest. costs (annual interest+repayment) [€/a]						
	Total (per step)	0 €	0 €	0 €	0 €	0 €	0 €
	Energy related (per step)	0 €	0 €	0 €	0 €	0 €	0 €
	Total (incl. previous steps)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
	Energy related (incl. previous steps)	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**

diary conditions Interest rate and inflation: Nominal interest rate #BEZUG! Inflation #BEZUG! Real interest rate #BEZUG!

average energy price (during service life): Electricity #BEZUG! Natural gas / Oil #BEZUG! Wood #BEZUG!

Building assemblies (U-values)

######

#BEZUG!

Assembly:		Area: #BEZUG!	m²
Areas with this assembly:			

Retrofit step: **3-3a: Roofs + Ventilation** 2016

Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
Fraction subarea 1	#WERT!	Fraction subarea 2	#WERT!	Fraction subarea 3	#WERT!	Total **#WERT!** cm
U-value supplement	#WERT! W/(m²K)				**U-value:**	W/(m²K)

preparation for subsequent steps:

1-Thermal insulation on the outside	**Ceiling airtight membrane cut through rafters to be sealed on eave, to get airtight continuity when retrofitting walls and eaves (see detail)**

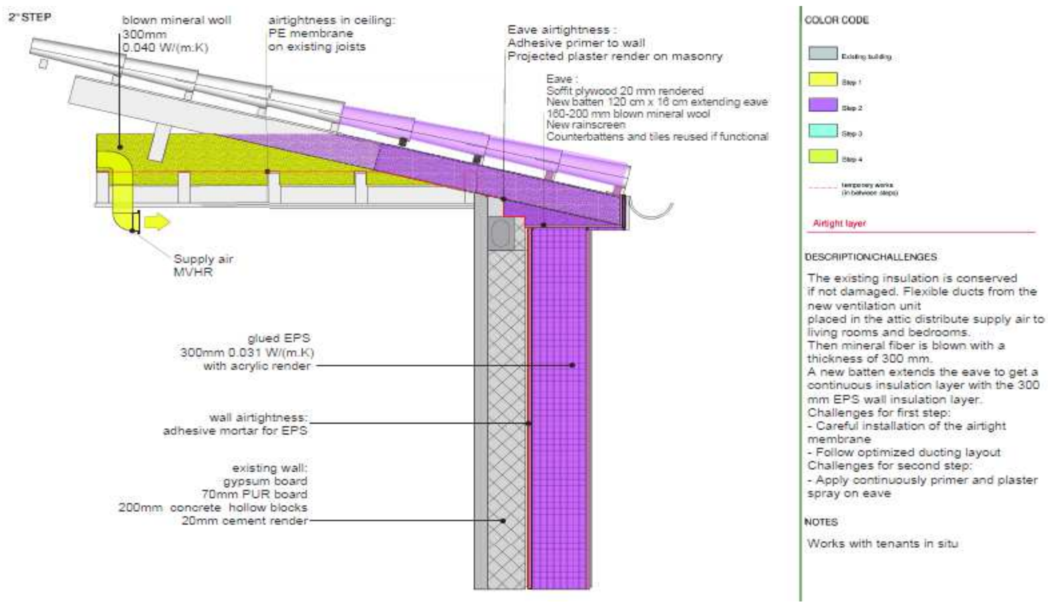
Retrofit step:

Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
Fraction subarea 1	100%	Fraction subarea 2	0%	Fraction subarea 3	0%	Total cm
U-value supplement	W/(m²K)				**U-value:**	W/(m²K)

Assembly: **0**

Advice

Plan / sketch / image



Description : Ceiling insulation and airtightness before EIFS

Building assemblies (U-values)

######

#BEZUG!

Assembly:

Area: #BEZUG! m²

Areas with this assembly:

Retrofit step: **4-4a: External insulation + Slabs** 2025

Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
Fraction subarea 1	#WERT!	Fraction subarea 2	#WERT!	Fraction subarea 3	#WERT!	Total **#WERT!** cm
U-value supplement	#WERT!	W/(m²K)			**U-value:**	W/(m²K)

preparation for subsequent steps:

7-Basement ceiling/floor slab insulation	**Perimeter buried insulation to avoid extra insulation of slabs on grade for living spaces**
7-Basement ceiling/floor slab insulation	**For garage spaces, wall insulation continued to slab level to minimize thermal bridges when slab insulation will be placed**

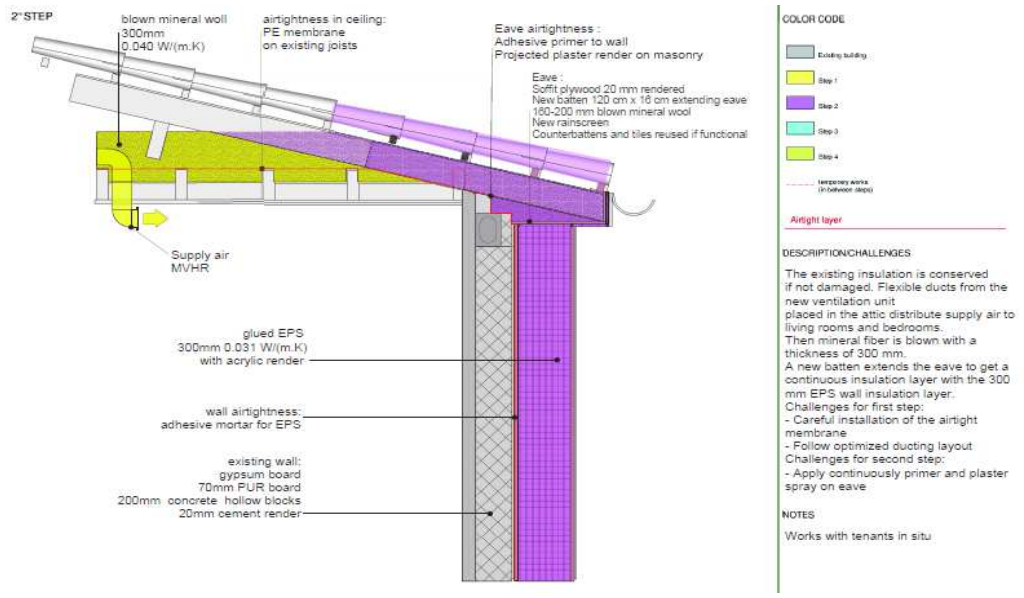
Retrofit step:

Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
Fraction subarea 1	100%	Fraction subarea 2	0%	Fraction subarea 3	0%	Total cm
U-value supplement		W/(m²K)			**U-value:**	W/(m²K)

Assembly: **0**

Advice

Plan / sketch / image



Description : EIFS junction to windows

Building assemblies (U-values)

######

#BEZUG!

Assembly:

Area: #BEZUG! m²

Areas with this assembly:

Retrofit step: **4-4a: External insulation + Slabs** 2025

Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!	#WERT!
	Fraction subarea 1		Fraction subarea 2		Fraction subarea 3	Total
	#WERT!		#WERT!		#WERT!	**#WERT!** cm
U-value supplement	#WERT!	W/(m²K)			**U-value:**	W/(m²K)

preparation for subsequent steps:

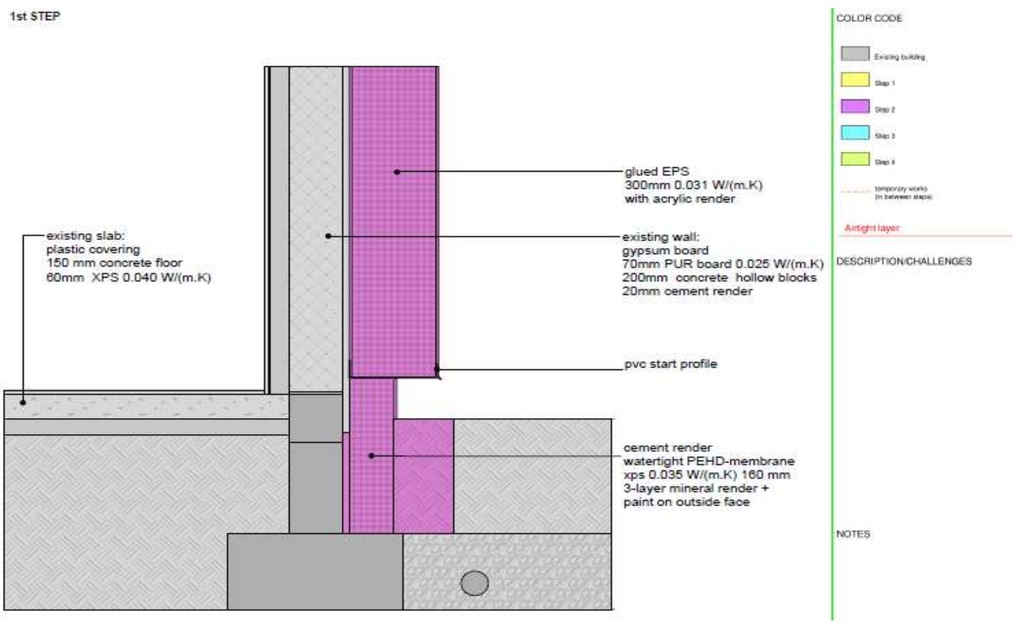
Retrofit step:

Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
	Fraction subarea 1		Fraction subarea 2		Fraction subarea 3	Total
	100%		0%		0%	cm
U-value supplement		W/(m²K)			**U-value:**	W/(m²K)

Assembly: **0**

Advice

Plan / sketch / image



Description : EIFS (step2) to avoid further insulation of dwelling slabs

Window (glazing and frame)

######

#BEZUG!

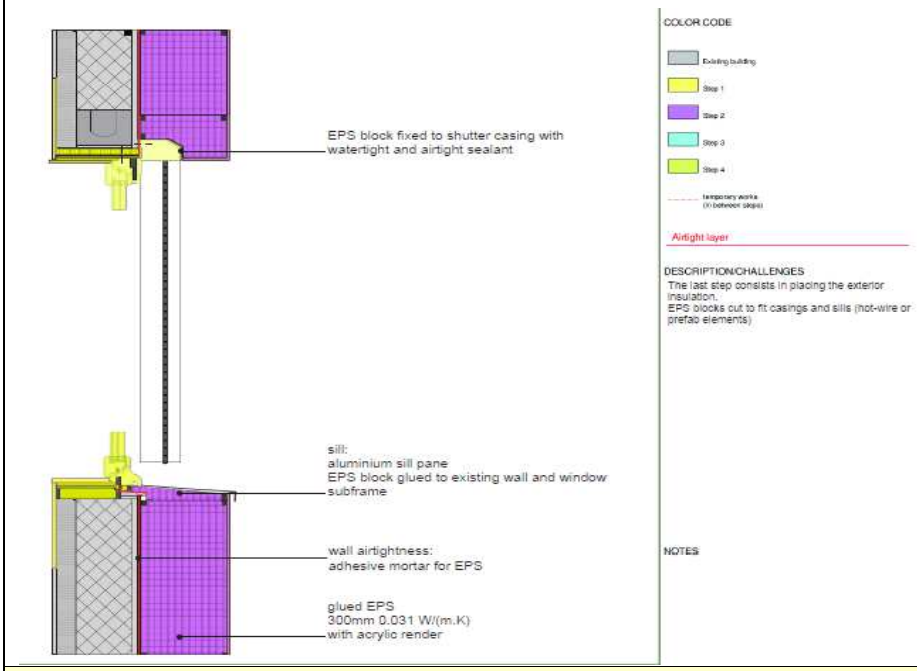
Window type:	a-Fenêtre un vantail (rgt-dégt. étage + WC RDC)	#BEZUG! m²

Retrofit step	Year	Glazing	U_g	Frame	U_f
2-2a: Windows + Doors	2016	#BEZUG!	######	#BEZUG!	######
preparation for subsequent steps:					
1-THERMAL INSULATION ON THE OUTSIDE	Prepare for subsequent thermal bridge minimised connection of the wall insulation				
7-BASEMENT CEILING/FLOOR SLAB INSULATION	For window doors in garages, airtight connection on outer face of wall, position anticipating insulation layer on top of slab				

Retrofit step	Year	Glazing	U_g	Frame	U_f

Advice

Plan / sketch / image



Description

Ventilation systems

#BEZUG!

#BEZUG!

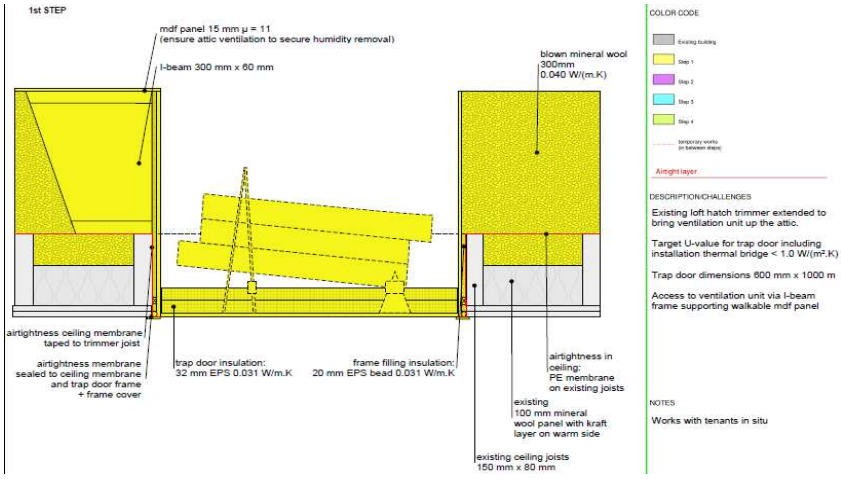
Retrofit step	Year	Ventilation type	Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
3-3a: Roofs + Ventilation	2016	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
preparation for subsequent steps:						
5-TOP FLOOR CEILING INSULATION		Retrofit attic trap door, install ducts between joists				

Retrofit step	Year	Ventilation type	Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
preparation for subsequent steps:						

Retrofit step	Year	Ventilation type	Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
preparation for subsequent steps:						

Advice

Plan / sketch / image



Ventilation systems

#BEZUG!

#BEZUG!

Retrofit step	Unit no.		Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
preparation for subsequent steps:						

Retrofit step	Unit no.		Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
preparation for subsequent steps:						

Retrofit step	Unit No.		Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
preparation for subsequent steps:						

Advice ventilation systems
Plan / sketch / image
Description

Heating & cooling

#BEZUG!

##

	Retrofit step:	**5-4: Grey water heat recovery + Solar thermal**		2030	
Heating		**Type**	**Type**	**Heating fraction**	**DHW fraction**
	Primary heat generator	#BEZUG!	#BEZUG!	#BEZUG!	#BEZUG!
	Secondary heat generator	#BEZUG!	-	#BEZUG!	#BEZUG!
Cooling		**used?**	**Seasonal performance factor**		
	Supply air cooling	#BEZUG!	#BEZUG!		
	Recirculatio cooling	#BEZUG!	#BEZUG!		
	Additional dehumidification	#BEZUG!	#BEZUG!		
	Panel Cooling	#BEZUG!	#BEZUG!		
preparation for subsequent steps:					
10-Boiler		**Adapt boiler power to new heat demand (heating and DHW)**			

	Retrofit step:				
Heating		**Type**	**Type**	**Heating fraction**	**DHW fraction**
	Primary heat generator				
	Secondary heat generator				
Cooling		**used?**	**Seasonal performance factor**		
	Supply air cooling				
	Recirculatio cooling				
	Additional dehumidification				
	Panel Cooling				
preparation for subsequent steps:					

	Retrofit step:				
Heating		**Kind**	**Type**	**Heating fraction**	**DHW fraction**
	Primary heat generator				
	Secondary heat generator				
Cooling		**used?**	**Seasonal performance factor**		
	Supply air cooling				
	Recirculatio cooling				
	Additional dehumidification				
	Panel Cooling				
preparation for subsequent steps:					

Advice Heating & cooling
Plan / sketch / image
Description

Other advice

#BEZUG!

#BEZUG!

Retrofit step:	5-5a: Grey water heat recovery + Solar thermal	2030
Advice: Send recovered heat to both shower and boiler		

Retrofit step:		
Advice: ...		

Retrofit step:		
Advice: ...		

Retrofit step:		
Advice: ...		

Retrofit step:		
Advice: ...		

Retrofit step:		
Advice: ...		

Attachments

#BEZUG!

####

Page	Phase	Type	Area	Name of document/plan
1	Design	Detail	Windows	CS06_D33_WIBO_WITO_Detail&Therm
2	Design	Detail	Ceiling Trap door	CS06_D33_TCTD_DetailA4
3	Design	Detail	Eave	CS06_D33_ROEA01_Detail&Therm_0316
4	Design	Detail	Slabs	CS06_D33_FSEW_Detail&Therm_0316
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Interrelations

###

	current step	subsequent steps			
		1-Thermal insulation on the outside	2-Insulation of the wall on the inside	3-Pitched roof insulation	5-Top floor ceiling insulation
1	Thermal insulation on the outside				
2	Insulation of the wall on the inside				
3	Pitched roof insulation	Provide an adequate roof overhang for later insulation of the façade. Provide temporary cladding of the underside of the roof overhang, keep in mind the thickness of the later wall insulation for connection of the downpipe to the ground			
5	Top floor ceiling insulation	Provide the possibility of later connection of insulation to the facade insulation without any gaps. Bring airtight membrane to exterior face of eave to get airtightness continuity when retrofitting walls			
7	Basement ceiling/floor slab insulation				
8	Perimeter insulation				

9	Window/entrance door replacement	Prepare for subsequent thermal bridge minimised connection of the wall insulation	Prepare for subsequent thermal bridge minimised connection of the wall insulation		
10	Boiler			Install solar collectors only after the roof insulation.	
11	Radiators and distribution		Mount heaters so that the wall behind can be insulated		
12	Ventilation system				With simultaneous insulation of the top floor ceiling (cost-effective even without general need for renovation) the warm air ducts may be routed in the attic in or under the insulation layer in a space saving manner
13	Photovoltaics			PV installation must take place after roof insulation.	
14					
15					
16					
17					
18					

	1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-THERMAL INSUL	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-THERMAL INSUL	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
	1-THERMAL INSUL	2-INSULATION OF '	3-Pitched roof insula	5-Top floor ceiling in
	1-Thermal insulation	2-Insulation of the w	3-PITCHED ROOF I	5-Top floor ceiling in

1-Thermal insulation	2-INSULATION OF ˙	3-Pitched roof insula	5-Top floor ceiling in
1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-TOP FLOOR CEIL
1-Thermal insulation	2-Insulation of the w	3-PITCHED ROOF I	5-Top floor ceiling in
1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in
1-Thermal insulation	2-Insulation of the w	3-Pitched roof insula	5-Top floor ceiling in

Text:

Please choose current measure on the right

7-Basement ceiling/floor slab insulation	8-Perimeter insulation	9-Window/entrance door replacement	10-Boiler	11-Radiators and distribution
	Use PVC / low conductivity base profile (no thermal bridge)		If necessary, decrease the forward flow temperature	
		Connect windows to the existing interior insulation layer via rigid insulation panels		
			If necessary, decrease the forward flow temperature	
		In case of insulation of the basement ceiling/floor slab, doors on the ground floor may have to be replaced at the same time.	Warm pipes can be laid in the basement ceiling insulation. If necessary, decrease forward flow temperature.	

The installation position of casement windows and doors in the basement should leave enough head room to allow for opening the window/door, even if insulation under the basement ceiling is installed later on -- or thresholds of french windows should be high enough to allow for subsequent installation of insulation above the basement ceiling	In case of a "heated" basement, prepare for subsequent thermal bridge minimised connection to perimeter insulation		If necessary, decrease the forward flow temperature	With Passive House suitable windows, the heaters can be placed anywhere (e.g. next to interior walls).
Pipe routing must not hinder installation of basement ceiling insulation, possibly provide for later integration into basement ceiling insulation.				
				If the heating load is reduced to Passive House level, supply air heating may be possible (heaters can be omitted completely or in part)

7-Basement ceiling/f	8-PERIMETER INSU	9-Window/entrance	10-BOILER	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-WINDOW/ENTRA	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-BOILER	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-WINDOW/ENTRA	10-BOILER	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-BASEMENT CEIL	8-PERIMETER INSU	9-Window/entrance	10-BOILER	11-RADIATORS AN
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis

7-BASEMENT CEILI	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-RADIATORS AN
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis
7-Basement ceiling/f	8-Perimeter insulatic	9-Window/entrance	10-Boiler	11-Radiators and dis

12-Ventilation system	13-Photovoltaics	14-	15-	16-
	PV installation must take place after roof insulation. Pipes/cables should already be laid in the insulation layer for later installation. Penetration of the airtight layer should be executed in an airtight manner. Solar panels can replace the roof covering.			
Ensure airtightness, check whether the ventilation unit will be installed in the attic later on. If necessary install ventilation ducts in the insulation layer already. If necessary prepare fresh air and exhaust air ducts	Pipes/cables should already be laid in the insulation layer for later installation. Penetration of the airtight layer should be executed in an airtight manner.			
Ventilation ducts can already be laid in the floor build-up				

To avoid mould formation, a ventilation system should be installed at the same time, in case sufficient ventilation (4 times a day) via windows is not possible				
Check the possibility of air heating by means of the boiler via a hydraulic post heating coil				

12-Ventilation syster	13-Photovoltaics	14-	15-	16-
12-Ventilation syster	13-Photovoltaics	14-	15-	16-
12-Ventilation syster	13-PHOTOVOLTAIC	14-	15-	16-
12-Ventilation syster	13-Photovoltaics	14-	15-	16-
12-VENTILATION S	13-PHOTOVOLTAIC	14-	15-	16-
12-Ventilation syster	13-Photovoltaics	14-	15-	16-
12-VENTILATION S	13-Photovoltaics	14-	15-	16-
12-Ventilation syster	13-Photovoltaics	14-	15-	16-
12-VENTILATION S	13-Photovoltaics	14-	15-	16-
12-VENTILATION S	13-Photovoltaics	14-	15-	16-

12-Ventilation syster 13-Photovoltaics	14-	15-	16-
12-Ventilation syster 13-Photovoltaics	14-	15-	16-
12-Ventilation syster 13-Photovoltaics	14-	15-	16-
12-Ventilation syster 13-Photovoltaics	14-	15-	16-
12-Ventilation syster 13-Photovoltaics	14-	15-	16-
12-Ventilation syster 13-Photovoltaics	14-	15-	16-
12-Ventilation syster 13-Photovoltaics	14-	15-	16-
12-Ventilation syster 13-Photovoltaics	14-	15-	16-

#BEZUG!

17-	18-

17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-

17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-
17-	18-

EnerPHit Retrofit Plan:
Source file:
(PHPP version:
Criteria fulfilled for
Savings
CO2 emissions (calculated with today's boundary conditions)