

D2.7 Output file of an overall refurbishment plan / English

INTELLIGENT ENERGY – EUROPE II

Energy efficiency and renewable energy in buildings IEE/12/070

EuroPHit

[Improving the energy performance of step-by-step refurbishment and integration of renewable energies]

Contract N°: SI2.645928



EnerPHit Retrofit Plan

Target standard: EnerPHit Premium



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

Energy	consulting	Example Energy Co Example Street 99 99999 Example Province	DE-Germa	Iny	Object: Climate data set: Climate zone: Owner: Pre-Certification:	End-of-terrad Example Stre 99999 Example Prov Row house DE-9999-PHF 3: Cool-tempo Passivhaus / Example Stre 99999 Example Prov Passive Hou Rheinstr. 44/4 64289	Ce Passive House et 99 Passivhaus-Reihenendhaus ince DE-Germany PP-Standard erate Altitude of location: Association of Owners et 99 Example City ince DE-Germany se Institute I6 Darmstadt DE-Germany	25.0
Year of o No. of dv	constructior welling units	n: 2016 s: 1		Int	terior temp. winter [°C]: Treated floor area:	20,0 156,0	Interior temp. summer [°C]: No. of occupants:	25,0 2,9
Energy demand [kWh/(m² _{TFA} a)]	400 350 300 250 200 150 100 50 0	Energy dem 329 1-Existing	and and ger	53 % Savings 156 3-Basement ceiling + roof	94 % Savings 20 4-Exterior wall + entrance door	fit step: 94 % 94 % Saving 20 5-Heat pu solar the newable print ference to print	S mp + rmal mary energy generation rojected building footprint	129 128 127 127 127 121 124 123 121 121 121 121 121 121 121
I confirm character	that the val	ues given herein have of the building. The P	been determined follow HPP calculations are a First name	wing the PHPP me attached to this veri	thodology and based or fication.	n the Last name		Signature
Passive	House Cor	Paul nsultancy Office	Company	Issued (date 30.03.2016	Passive Passivetown	City]	-

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

EnerPHit Retrofit Plan

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.

The modernisation route planner as well as other relevant documents can be checked by a PHI accredited certifier for 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!

Paul Passive (Passive House Consultancy Office)

Scheduler	Sour	ce fi	le:	'Eur	oPH	lit_C)2.4	_Ba	alano	cing	Too	lforS	SBS	Reti	rofits	s_E	N_F	PHI.>	klsm	' (P	HPF	o ve	rsio	n: 9.	.6a)
EnerPHit Retrofit Plan: End-of-terrace	e Passive	Ηοι	use,	Exa	amp	le C	ity, I	DE-	Ger	man	ıy														
Retrofit steps: Image: Constraint of the steps in the step in the st																									
	Last	0	5 2	0	2	0	2	0	S	0	2	0	2 2	0	5	9	7		S		5 C		5 2	0	2
Assemblies	l	195	195	196	196	197	197	198	198	199	199	200	200	201	201	201	501	202	202	203	203	204	204	205	205
Render facade	1976																				Х				
Facade decoration																									
Balconies/Loggias	1976																				Х				
Exterior door	1987																				Х				
Pitched roof covering	1956																		Х						
Flat roof																									
Roof weatherings	1987																		Х						
Window	1976																Х								
Blinds / sun screens	1976																Х								
Basement ceiling	2025																		Х						
Boiler	2015																					Х			
Ventilation	2017																Х								
Solar thermal system	2040																					Х			
Airtightn. test: X, Leakage search	: (X)																(X)		(X)		Х	_			
		X]Ini Re da	tial etro ⁻ tes	cor fit	ndit	ion				Ma ter Sn rer	ain- nan nall pair	ce er s						Ex rep Im rep	ten bair me blac	siv s dia	e te nen	t		

Overview of measures	5				Source file: 'EuroPH	lit_D2.4_BalancingToolforSBS	Retrofits_EN_PHI.xlsm' (PHPP)	version	: 9.6a)
EnerPHit Retrofit Plan: End-of-terrace Passive Hous	e, Example City,	DE-Germany							
Retrofit step No.		1-Existing	2-Window + ventilation	3-Basement ceiling + roof	4-Exterior wall + entrance door	5-Heat pump + solar thermal			
Year		2016	2017	2025	2035	2040			
Measures									
Occasion ("anyway measure")	а		New windows	none	New render	New boiler			
			Passive House windows	Basement ceiling insulation	External wall insulation	Heat pump			
Energy-saving measure			E la stala stala	No. or of the sector	N	No. 1 of other last			
Occasion ("anyway measure")	b		Heat recovery ventilation	New roor covering Reaf insulation	New entrance door	New not water tank		1	
Energy-saving measure			system		rassive nouse door	stratified storage tank		1	
Occasion ("anyway measure")	С			New roof covering					
Energy-saving measure				Photovoltaic system					
Occasion ("anyway measure")	d							1	
Energy-saving measure								1	
Occasion ("anyway measure")	e							1	eria
Occasion ("anyway measure")	f								rite
Energy-saving measure	•								0 C
Occasion ("anyway measure")	g								ti
Energy-saving measure								ria	na
Occasion ("anyway measure")	h							rite	lter
Energy-saving measure								Ū	₹
Component characteristics									
Wall to ambient air, ext. insulation (U-value)	[W/(m²K)]	1,57	1,57	1,57	0,15	0,15			
Roof (U-value)	[W/(m ² K)]	1,84	1,84	0,14	0,14	0,14			
Building envelope to ambient (U value)	[W/(m ² K)]	1,65	1,65	1,12	0,14	0,14		0,15	-
Wall to ground, ext. Insulation (U-value)	[VV/(m²K)]	0.72	0.72	0.26	0.26	0.26			<u> </u>
Basement centry / noor stab (0-value)	[W/(m²K)]	0,72	0,72	0,26	0,26	0,26		0.27	
Wall, int, insulation to ambient air (U-Value)	[W/(m²K)]	-	-	-	-	-		0.35	-
Wall, int. insulation to ground (U-Value)	[W/(m ² K)]	-	-	-	-	-		0,51	-
Flat roof (solar reflection index, SRI)	[W/(m ² K)]	-	-	-	-	-		-	-
Inclined and vertical external surface (SRI)	[W/(m ² K)]	33	33	33	33	33		-	-
Windows / doors (U _{installed})	[W/(m²K)]	2,87	0,78	0,78	0,78	0,78		0,85	-
Windows (U _{W,installed})	[W/(m²K)]	-	-	-	-	-		1,00	-
Windows (U _{W,installed})	[vv/(m²K)]	-	-	-	-	-		1,10	-
Glazing (g-value)	[]	0,77	0,50	0,50	0,50	0,50		0,36	-
Glazing/sun protection (max. solar load)	[KVVN/(m²a)]	404	125	107	51	13		- 75	-
Ventilation (effective humidity recovery	[78]		02	02	02	02		15	<u> </u>
efficiency)	[%]							-	-
Airchange at press. test n ₅₀	[1/h]	5,0	1,0	1,0	1,0	1,0		1,0	-
Building characteristics									
Heating demand	[kWh/(m²a)]	329	245	156	20	20		-	-
Heating load	[W/m ²]	142	98	67	16	16		-	-
Cooling + dehumidification demand	[kWh/(m²a)]	7	2	1	0	0		-	-
	[kWh/(m²a)]	33	1/	10	5	4		-	-
Frequency of overheating (> 25 °C)	[%]	-	-	-	-	-		10	
Non-renewable primary energy (PE demand)	[kWh/(m²a)]	506	405	296	134	46		-	
Renewable primary energy (PER demand)	[kWh/(m ² a)]	994	784	559	224	39		36	39
Renewable primary energy generation	[k\//b//m2=\]	0	0	110	110	109		120	126
(reference to projected building footprint)	[kvvn/(m•a)]			119		128		120	120
Criteria fulfilled for EnerPHit Premiur	n?		no	no	no	yes			
Annual energy-related extra costs									
Energy-related invest. (interest+repayment)	[€/year]	0	328	606	1100	1448			
Expected energy costs	[€/vear]	5390	4400	3280	1640	1000			
(total of all energy use in the building) Total costs	[€/vear]	5390	4728	3886	2740	2448			
	[_, jour]			5000			1		

Source file: 'EuroPHit_D2.4_BalancingToolforSBSRetrofits_EN_PHI.xlsm' (PHPP version: 9.6a)







Investment and maintenance costs

Source file: 'EuroPHit_D2.4_BalancingToolforSBSRetrofits_EN_PHI.xlsm' (PHPP version: 9.6a)

			3-Basement ceiling +	4-Exterior wall +	5-Heat pump + solar	
Retrofit step No.	1-Existing	2-Window + ventilation	roof	entrance door	thermal	
Year	2016	2017	2025	2035	2040	
a Occasion ("anyway measure")		New windows	none	New render	New boiler	
Investment costs		11.180 €	0€	6.440 €	12.000 €	
Maintenance costs		0€	0€	0€	320 €	
		Passive House	Basement ceiling	External wall		
Energy-saving measure		windows	insulation	insulation	Heat nump	
Investment costs		16.770 €	2.160 €	23.920 €	16.000 €	
Financial support (present value)		1.677 €	216 €	2.392 €	1.600 €	
Maintenance costs		0€	0€	0€	100 €	
Service life [vears]		40	50	50	20	
Invest costs (energy related)	0 €	3 913 €	1 944 €	15 @8 €	2 400 €	0 €
Maintenance costs (energy related)	0€	0.515 C	0.E	13.000 C	-220€	0€
Present value factor (service life)	0	27	32	32	16	00
Appuity factor (service life)	0.00%	3.64%	3 17%	3 17%	6 10%	0.00%
	0,00%	5,04 %	5,17%	5,17% 682 C	0,10% 070 £	0,00%
Appuity (operay related only)	0€	1/3 €	02 € 62 €	002 € 478 €	-74 €	0€
Annuity (energy related only)	υte	143 €	02 E	4/0 €	-/4 €	ve
Occasion ("anyway measure")		Exhaust air system	New roof covering	New entrance door	New hot water tank	
Investment costs		4.680 €	5.810 €	1.000 €	1.000 €	
Maintenance costs		50 €	0€	0€	0€	
		Heat recovery			Solar thermal system +	
Energy-saving measure		ventilation system	Roof insulation	Passive House door	stratified storage tank	
Investment costs		8.580 €	11.620 €	1.600 €	7.500 €	
Financial support (present value)		858 €	1.162 €	160 €	750 €	
Maintenance costs		100 €	0€	0€	70 €	
Service life [years]		30	50	40	20	
Invest. costs (energy related)	0€	3.042 €	4.648 €	440€	5.750 €	0€
Maintenance costs (energy related)	0€	50 €	0€	0€	70 €	0€
Present value factor (service life)	0	22	32	27	16	0
Annuity factor (service life)	0,00%	4,45%	3,17%	3,64%	6,10%	0,00%
Annuity (total)	0€	444 €	331 €	52€	482 €	0€
Annuity (energy related only)	0 €	185 €	147 €	16 €	421 €	0€
Occasion ("onyway moasure")			New reef covering			
Investment costs						
Maintenance costs			1 500 €			
			Photovoltaic system			
Investment costs			28 200 £			
Financial support (procent value)			20.200 €			
Maintenance costs			2.020 €			
Service life [vears]			20 €			
Invest costs (operative related)	0.6	0.6	20 25.290 E	0.6	0.6	Æ
Maintononoo oosta (onorgy related)	0 €	0 €	20.000 E	0€	06	بد ٥.٢
Propert value factor (convice 151)	UE	UE	-1.400 €	0 €	UE	U E
Appuits factor (service life)	0.000/	U 0.000/	10	0.000/	U 0.000/	U 0.000/
Annulty factor (service life)	0,00%	0,00%	0,10%	0,00%	0,00%	0,00%
	U E	U E	1.569 €	0€	Uŧ	Uŧ
Annuity (energy related only)	0€	0€	69€	0€	0€	0€
otal Invest. costs (annual interest+	repayment) [€/a]					
otal (per step)	0€	994 €	1.962 €	735€	1.461 €	0€
nergy related (per step)	0€	328€	278€	494 €	347 €	0€
otal (incl. previous steps)	0€	994 €	2,956 €	3,691 €	3 52 €	5,152 €
nergy related (incl. previous steps)	0.€	328 €	606 €	1100 €	1.448 €	1.448 €
Boundary conditions: Interest rate and inflation	: Nominal interest rate	3.0%	Inflation	1.0%	Real interest rate	2.0%
Average energy price (during service life)	: Electricit	/ 0,25 €	Natural gas / Oi	1 0,07 €	Wood	0,07 €

InterNet Retord Plan. End-diverso Passive House, Example (b), DE-Germany Assembly: Olud-External wall Area: 184,3 m² Areas with this assembly: External wall south, External wall north, External wall west Retroft step External wall south, External wall north, External wall west Interior plaster 0.350 10000 Interior plaster 0.350 10000 External biok 0.000 10000 Exterior Render 0.800 10000 Exterior Render 0.800 0 Uvalue supplement 0 W(mR) Uvalue: 100% 0% Uvalue: 1,568 Uvalue supplement 0 W(mR) Uvalue: 15 300 1 10000 100000 1000000 Exterior subares 1 Fraction subares 2 (optional) 1000000 1000000 1000000 Subares 1 Inversion Subares 2 (optional) 1000000 10000000 10000000 100000000 1000000000000000000000000000000000000	Building asso	emblie	es (U-values)	le: 'EuroPH	it_D2.4_BalancingToolfor	SBSRetro	ofits_EN_F	PHI.xls	m' (PHPP vers	ion: 9.6a)
Assembly: Orde-External wall Advice	EnerPHit Retrofit Plan: End-of-	terrace Passiv	e House, Example City, DE-G	ermany						
Areas with this assembly: External wall south, External wall north, External wall west Retroft step: Existing Subares 2 (optional) Invinced Subares 2 (optional) Invinced Total To		Assembly:	01ud-External wall					Area:	184,3	m²
Retrofit step: 1-Existing Subarea 1 [Winwi] Subarea 2 (optional) [Winwi] Thickness (mm) Interior plaster 0.360 15 360 Polystyrene 0.000 10 15 Exterior Render 0,800 10 20 Proction subarea 1 Fraction subarea 2 Fraction subarea 3 Total 100% 0% 0% 0% 39,5 om U-value supplement 0 0 360 20 20 20 Exterior Render 0.360 0% 0% 0% 20	Areas with thi	is assembly:	External wall se	outh, E	External wall r	north	, Exte	erna	l wall w	est
Subares 1 I (WILMY) Subares 2 (optional) I (WILMY) Subares 3 (optional) I (WILMY) Thickness (mm) Time: sand brick 0,900 I I I I I (WILMY) Subares 3 (optional) I (WILMY) Thickness (mm) Polystyrene 0,000 I I I I I I I (WILMY) Subares 3 (optional) I (WILMY) Thickness (mm) Subares 1 Fraction subares 2 Fraction subares 3 Total Total Image: 1 Fraction subares 2 Offs Offs 39,5 om U-value supplement 0 W(ImYK) Uvalues: Total 39,5 om Subares 1 Image: 4Exterior wall + entrance door Image: 4Exterior wall + entrance door<		Retrofit step:	1-Existing							
Interior plaster 0.350	Subarea 1	[[W/(mK)]	Subarea 2 (optional)	[[W/(mK)]	Subarea 3 (optional)		l [W/(mK)]		Thickness [mm]	
Ime sand brick 0.900	Interior plaster	0,350							15	
Polystyrene 0.000 0 0 Exterior Render 0.800 0 0 Image: Stepson St	Lime sand brick	0,900							360	
Exterior Render 0,800	Polystyrene	0,000							0	
Fraction subares 1 Fraction subares 2 Fraction subares 3 Total 100% 0% 0% 0% 39,5 on U-value supplement 0 0% 0% 1,568 W(mK) Retrofit step: 4-Exterior wall + entrance door Subares 1 10%(mK) U-value: 1,568 W(mK) Thickness [mm] Jame sand brick 0,900 1 10% 20 20 20 <td>Exterior Render</td> <td>0,800</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>20</td> <td></td>	Exterior Render	0,800							20	
Fraction subarea 1 Fraction subarea 2 Fraction subarea 3 Total 100% 0% 0% 39,5 on U-value supplement 0 W(m%) U-value: 1,568 W(m%) Retroft step: 4-Exterior wall + entrance door Image: 1										
Fraction subares 1 Fraction subares 2 Fraction subares 3 (rdd Uvalue supplement 0 0% 0% 0% 0% Subares 1 [rw/(mK)] W/(mK) Uvalue: 1,568 W/(mK) Subares 1 [rw/(mK)] Subares 2 (optional) [rw/(mK)] Thickness [mm] 15 James and brick 0,300 15 360 200 20 20 Stateres 1 [rw/(mK)] Subares 2 (optional) [rw/(mK)] Thickness [mm] 15 Jime sand brick 0,300 15 360 200 20 20 Staterior Render 0,800 16 100% 20										
Uvalue supplement 0 0% 39,5 cm Uvalue supplement 0 W(m*K) Uvalue: 1,568 W/(m*K) Subarea 1 Itwimki Subarea 2 (optional) Itwimki Subarea 3 (optional) Itwimki Thickness (mm) Interior plaster 0,350 1 15 360 200<	Fra	action subarea 1	Fracti	on subarea 2	1	Fraction	subarea 3	1	Total	
U-value supplement 0 W/(m%) U-value: 1,568 W/(m%) Retrofit step: 4-Exterior wall * entrance door I/W/(m%) Subarea 2 (optional) I/W/(m%) Thickness [mm] Subarea 1 1/W/(m%) Subarea 2 (optional) I/W/(m%) Subarea 3 (optional) I/W/(m%) Line sand brick 0,300 1 15 360 200 20 200<		100%		0%			0%		39,5	cm
Retrofit step: FExterior wall + entrance door Subarea 1 IW/(mk) Subarea 2 (optional) IW/(mk) Thickness [mm] Interior plaster O,350 Thickness [mm] Thickness [mm] Interior plaster O,330 Thickness [mm] Thickness [mm] Olystyrene O,032 Colspan="2">Colspan="2">Colspan="2">Colspan="2">Total Subarea 1 Fraction subarea 2 Fraction subarea 3 Total Colspan="2">Total Total Total O% O% Sp.5 cm V-value supplement O W/mRK) U-value: O,145 W/mRK) V-value supplement Steps: PERIMETER INSULATION No metallic base profiles (thermal bridge) IPERIMETER INSULATION No metallic base profiles (thermal bridge) Assembly: O1ud-External wall Advice	U-value supplement	0	W/(m²K)				U-v	alue:	1,568	W/(m²K)
Subarea 1 IpWimAl Subarea 2 (optional) IpWimAl Subarea 3 (optional) IpWimAl Thickness [mm] Interior plaster 0,350		Retrofit step:	4-Exterior wall + entrance doo	or						
Interior plaster 0,350 11 Lime sand brick 0,900 15 Polystyrene 0,032 200 Exterior Render 0,800 200 Exterior Render 0,800 200 Ime sand brick 0,900 200 Exterior Render 0,800 200 Ime sand brick 0,900 200 Ime sand brick 0,800 10 Ime sand brick 0,900 10 Ime sand brick 0,900 10% Ime sand brick 0,900 10% Ime sand brick 0,900 10% U-value supplement 0 Ime sand bridge) If necessary, decrease the forward flow temperature 10 Ime sate bly: 01ud	Subarea 1	[[W/(mK)]	Subarea 2 (optional)	[[W/(mK)]	Subarea 3 (optional)		[[W/(mK)]		Thickness [mm]	
Lime sand brick 0,900	Interior plaster	0,350							15	1
Polystyrene 0,032	Lime sand brick	0,900							360	
Exterior Render 0,800	Polystyrene	0.032							200	
Image: Construction of the subares at the subares	Exterior Render	0.800							20	
Fraction subarea 1 Fraction subarea 2 Fraction subarea 3 Total 100% 0% 0% 59,5 cm U-value supplement 0 W/(m²K) U-value: 0,145 W/(m²K) preparation for subsequent steps:		-,								-
Fraction subarea 1 Fraction subarea 2 Fraction subarea 3 Total 100% 0% 0% 59,5 cm U-value supplement 0 W/(m²K) U-value: 0,145 W/(m²K) orgenation for subsequent steps:										
Fraction subarea 1 Fraction subarea 2 Fraction subarea 3 Total 100% 0% 0% 59,5 cm U-value supplement 0 W/(m²K) U-value: 0,145 W/(m²K) oreparation for subsequent steps: Image: Construct of the steps										
Fraction subarea 1 Fraction subarea 2 Fraction subarea 3 Total 100% 0% 0% 59,5 cm U-value supplement 0 W/(m²K) U-value: 0,145 W/(m²K) preparation for subsequent steps:										
100% 0% 59,5 cm U-value supplement 0 W/(m²K) U-value: 0,145 W/(m²K) oreparation for subsequent steps:	Fra	action subarea 1	Fracti	on subarea 2	1	Fraction	subarea 3	1	Total	
U-value supplement 0 W/(m²K) U-value: 0,145 W/(m²K) preparation for subsequent steps: 3-PERIMETER INSULATION No metallic base profiles (thermal bridge) 10-BOILER If necessary, decrease the forward flow temperature		100%]	0%			0%		59.5	cm
poreparation for subsequent steps: 3-PERIMETER INSULATION No metallic base profiles (thermal bridge) 10-BOILER If necessary, decrease the forward flow temperature	U-value supplement	0	W/(m²K)		J		U-v	alue:	0,145	W/(m²K)
B-PERIMETER INSULATION No metallic base profiles (thermal bridge) I0-BOILER If necessary, decrease the forward flow temperature Intersection Intersection Intersectin Intersection	preparation for subseque	nt steps:	-							_
If necessary, decrease the forward flow temperature Image: Image Image: Image Image: Image	8-PERIMETER INSULATION		No metallic base profiles	s (thermal	bridge)					
Assembly: 01ud-External wall Advice Plan / sketch / image	10-BOILER		If necessary, decrease th	he forward	flow temperature					
Assembly: 01ud-External wall Advice Plan / sketch / image										
Assembly: 01ud-External wall Advice Plan / sketch / image	-									
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Assembly: 01ud-External wall Advice Plan / sketch / image										
Assembly: 01ud-External wall Advice Plan / sketch / image										
Plan / sketch / image		Assembly:	01ud-External wall							
	Plan / sketch / image	Advice								

Before the wall insulation can be applied, move the windows from the brick wall layer to the outside.

Areas with this a	assembly:					,
Re		Roof				
	etrofit step:	1-Existing				
Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
Chipboard	0,130					50
Blown Mineral Wool	0,000	I-Beam	0,374			0
Gypsum Plasterboard	0,700					13
Fract	ion subarea 1	 	Fraction subarea 2		Fraction subarea 3	Total
	98%]	2%]	0%	63 cm
U-value supplement	0	W/(m²K)	270		U-v	/alue: 1.843 W/(m²K
Re	etrofit step:	3-Basement ceiling + roo	f			
Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
Chipboard	0,130					50
Blown Mineral Wool	0,040	I-Beam	0,374			300
Sypsum Plasterboard	0,700					13
Fract	ion subarea 1	l l	-raction subarea 2	1	Fraction subarea 3	Total
	98%		2%]	0%	30,3 cm
U-value supplement	0	W/(m²K)			U-v	value: 0,140 W/(m ² K
preparation for subsequent	steps:			(1) (1) (1) (1)		
3-Photovoltaics		PV installation must insulation layer for la airtight manner. Sola	take place aft ater installatio ar panels can	er root insulation. P on. Penetration of the replace the roof cov	ipes/cables shou e airtight layer sh ering.	Id already be laid in the ould be executed in an

Assembly: 02ud-Roof Advice	
Plan / sketch / image	
Description	

	Assembly:	03ud-Basement ceil	ling			Area:	80,9	m²
Areas with this	s assembly:	Basement floor						
	Retrofit step:	1-Existing						
Subarea 1	[[W/(mK)]	Subarea 2 (optional)	I [W/(mK)]	Subarea 3 (optional)	[[W/(mK)]	т	hickness [mm]	
Parquet	0.130		1 1 1			Ē	22	1
Screed	1,050					-	48	1
Impact sound insulation	0,040					-	30	1
Concrete	2,100						160	1
Polystyrene	0,000						0	
Plaster Coat	0,800						10	-
						_		-
Fra	action subarea 1	Fraction	1 subarea 2	<u> </u>	Fraction subarea 3	Т	otal	J
	100%		0%]	0%		27,0	cm
U-value supplement	0	W/(m²K)		_	U-v	alue:	0,718	W/(m²ł
	Retrofit step:	3-Basement ceiling + roof		2 1 2 1 1 1		-		
Subarea 1	0 130	Subarea 2 (optional)	I [W/(mK)]	Subarea 3 (optional)	I [W/(mK)]		nickness [mm]	1
Screed	1 050						48	-
Impact sound insulation	0.040					-	30	-
Concrete	2 100					-	160	
Polystyrene	0.028					-	70	-
Plaster Coat	0.800					-	10	
	0,000						10	
							atal	
	ation outpares 1	Fraction	v authorea 0		Fraction substant 2		olai	lam
Fra	action subarea 1 100%	Fraction	1 subarea 2 0%		Fraction subarea 3	Т	34,0	CIII
Fra U-value supplement	action subarea 1 100% 0	Fraction	n subarea 2 0%]	Fraction subarea 3 0% U-v	⊺ alue:	34,0 0.257	W/(m²ł
Fra U-value supplement preparation for subsequel	action subarea 1 100% 0 nt steps:	Fractior	n subarea 2 0%]	Fraction subarea 3 0% U-v	alue:	34,0 0,257	W/(m²
Fra U-value supplement preparation for subseque	action subarea 1 100% 0 nt steps:	Fractior	n subarea 2 0%]	Fraction subarea 3 0% U-v	alue:	34,0 0,257	W/(m²ł
Fra U-value supplement preparation for subseque	action subarea 1 100% 0 nt steps:	Fraction	n subarea 2 0%		Fraction subarea 3 0% U-v	alue:	34,0 0,257	W/(m²ł
Fra U-value supplement preparation for subseque	action subarea 1 100% 0 nt steps:	Fraction	n subarea 2 0%		Fraction subarea 3 0% U-v	alue:	34,0 0,257	W/(m²ł
Fra U-value supplement preparation for subsequer	action subarea 1 100% 0 nt steps:	Fraction	o subarea 2 0%		Fraction subarea 3 0% U-v	alue:	34,0 0,257	W/(m ²

Assembly: 03ud-Basement ceiling	
Advice	
Plan / sketch / image	
Description	

Window (glazing and frame)

EnerPHit Retrofit Plan: End-of-terrace Passive House, Example City, DE-Germany

W	/indow type	a-Opening casement 1	Fläche: 32,4212 m ²		
Retrofit step	Year	Glazing	Ug	Frame	U _f
1-Existing	2016	93ud-Double insulated glazing 4/12mm air /4	2,9	53ud-EXISTING: timber 45 mm	2,5
Retrofit step	Year	Glazing	Ug	Frame	U _f
2-Window + ventilation	2017	02ud-Triple-insulated-Kr12	0,58	quality	0,72
preparation for subsequent steps:					
1-EXTERIOR WALL INSULATION	Prepare for	or subsequent thermal bridge minimised connection of	of the w	all insulation	
7-BASEMENT CEILING/FLOOR SLAB	The instal	lation position of casement windows and doors in the	basem	ent should leave enough head room	to allow
INSULATION	for openir	g the window/door, even if insulation under the base	nent ce	iling is installed later on or thresho	lds of
12-VENTILATION SYSTEM	times a da	w) via windows is not possible	neu at t	ne same time, in case sufficient venti	1411011 (4

Retrofit step	Year	Glazing	Ug	Frame	U _f

Advice

Plan / sketch / image

The window is first installed in the brickwall layer, as long as the wall insulation hasn't been mounted. As soon as the walls are going to be insulated, the windows can be moved to the ideal position in the insulation layer. The inner reveals can be covered with wood boards, the airtight connection between window frame and walls is also hidden.

Window (glazing and frame) EnerPHit Retrofit Plan: End-of-terrace Passive House, Example City, DE-Germany

w	/indow type:	b-Opening casement 2	Fläche: 11,04 m ²			
Retrofit step	Year	Glazing	Ug	Frame	Uf	
1-Existing	2016	93ud-Double insulated glazing 4/12mm air /4	2,9	54ud-EXISTING: timber 68 mm	1,6	
Retrofit step	Year	Glazing	Ug	Frame	U _f	
2-Window + ventilation	2017	02ud-Triple-insulated-Kr12	0,58	quality	0,72	
preparation for subsequent steps:						
1-EXTERIOR WALL INSULATION	Prepare for	r subsequent thermal bridge minimised connection c	of the wa	all insulation		
7-BASEMENT CEILING/FLOOR SLAB INSULATION 12-VENTILATION SYSTEM	The install for openin to avoid in times a da	ation position of casement windows and doors in the g the window/door, even if insulation under the base noun rormation, a ventilation system should be insta available in the possible	e basem ment ce neu at ti	ent should leave enough head room to iling is installed later on or threshol ne same time, in case sumclent ventue	o allow ds of auon (4	

Advice Plan / sketch / image

Description

Ventilation systems

Retrofit step	Year	Ventilation type	Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
1-Existing	2016	ventilation	-	-	-	-
Retrofit step	Year	Ventilation type	Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
2-Window + ventilation	2017	1-Balanced PH ventilation with HR	01ud-HRV	0,83	0	0,4
preparation for subsequ	uent steps:					
11-RADIATORS AND DISTRIBUTION		If the heating load is re can be omitted comple	educed to Passive House etely or in part)	level, supply air h	eating may be po	ossible (heaters

Advice
Plan / sketch / image
Description
Description

				Annual	electricity yield after inverter
Step	Technology	Module area [m²]	Location	absolute [kWh/a]	related to projected building footprint area [kWh/(m²projecteda)]
1-Existing					
				Annual	electricity yield after inverter
Step	Technology	Module area [m²]	Location	Annual absolute [kWh/a]	electricity yield after inverter related to projected building footprint area [kWh/(m²projecteda)]

				Annual	electricity yield after inverter
Step	Technology	Module area [m²]	Location	absolute [kWh/a]	related to projected building footprint area [kWh/(m ² projecteda)]
preparation for subsequent steps:					

Advice Photovoltaics		
Plan / sketch / image		
Description		

Heating & cooling

	Retrofit step:	1-Existing		2016	
		Туре	Туре	Heating fraction	DHW fraction
eating	Primary heat generator	4-Heating boiler	21-Low temperature boiler oil	100%	100%
Ψ	Secondary heat generator	-	-	0%	0%
		used?	Seasonal performance factor		
_	Supply air cooling	-	-		
oling	Recirculatio cooling	х	2,4		
ŏ	Additional dehumidification	-	-	-	
	Panel Cooling	-	-		
	Retrofit step:	5-Heat pump + solar thermal		2040	

	iten ent etepi			2010	
		Туре	Туре	Heating fraction	DHW fraction
eating	Primary heat generator	2-Heat pump	1-Standard Air/Water heat pump	100%	100%
۹H	Secondary heat generator	-	-	0%	0%
		used?	Seasonal performance factor		
	Supply air cooling	х	3,2		
oling	Recirculatio cooling	-	-		
ŏ	Additional dehumidification	x	2,6		
	Panel Cooling	-	-		
pre	paration for subsequ	ient steps:			
12- SY	VENTILATION STEM	Check the possibility of air heatin	g by means of the boiler via a hydraul	lic post heating co	bil

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EnerPHit Retrofit Plan: End-of-terrace Passive House, Example City, DE-Germany	
Retrofit step:	
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Retrofit step:	
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At	Attachments Source file: 'EuroPHit_D2.4_BalancingToolforSBSRetrofits_EN_PHI.xlsm' (PHPP version: 9.6a)			
EnerP	EnerPHit Retrofit Plan: End-of-terrace Passive House, Example City, DE-Germany			
Page	Phase	Туре	Area	Name of document/plan
1	All	DWG / PDF		Ground Floor Plan
2	All	DWG / PDF		First Floor Plan
3	All	DWG / PDF		Section
4	All	DWG / PDF		Elevations
5	Step 2	DWG / PDF		Details Windows
6	Steps 3+4	DWG / PDF		Details Wall-Roof-Connections
7	Step 5	DWG / PDF		Ventilation System
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Technical References

Project Acronym	EuroPHit
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Lead beneficiary	PHI
Contributing beneficiary(ies)	
Author(s)	Zeno Bastian
Co-author(s)	Jan Steiger
Date	30.03.2016
File Name	EuroPHit_D2.7_EnerPHitRetrofitPlan_EN_PHI

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