

D3.9_EnerPHit Retrofit Plan



Project: OP24 – Community Center, La Providenza, Pergine Valsugana (TN), Italy

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]

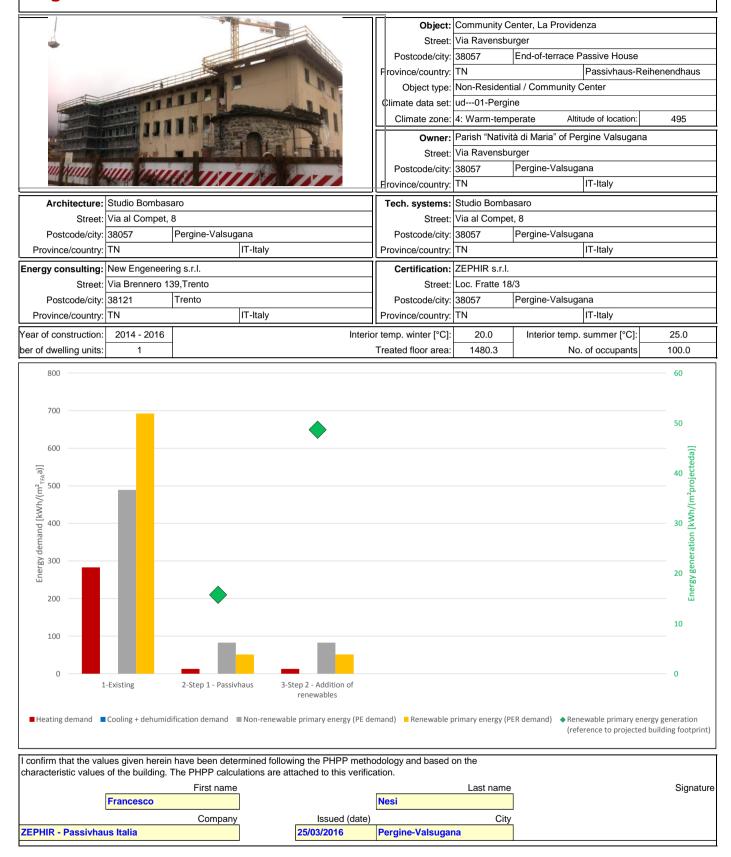
Contract N°: SI2.645928



EnerPHit Retrofit Plan

Euro**PHit**

Target standard: Passive House Classic



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.

Pre-certification

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!

Francesco Nesi (ZEPHIR - Passivhaus Italia)

Scheduler

EnerPHit Retrofit Plan: Community Center, La Providenza, Pergine-Valsugana, IT-Italy

Retro	it steps:				1		2																		
Assemblies	Last renewa I	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100	2105	2110	2115
External Wall	2014				Х																				
External Wall Ground	2014				х																				
Roof / Top Floor Ceiling	2014				х																				
Other Ceilings	2014				х																				
Window and Door	2014				х																				
Skylight	2014				х																				
Floor Slab	2014				х																				
Heat Generation System	2014				х																				
Ventilation-related systems	2014				х																				
Solar thermal system	2014				х																				
PV integrated Facade	2025						х																		
PV Roof	2025						х																		
Airtightness	2014				х																				
Airtightn. test: X, Leakage search	: (X)				х																				
		X	Re	etro		ndit	ion				ter Sn	ain- nan nall	ce er						Re Im	ten pai me	rs dia	te			
			da	tes							Re	epai	irs						rep	olac	em	nen	t		

Overview of measures	luureen IT kelu			Source file	e: 'PHPP_V9.3a_EN_OP24_Pr	ovvidenza_ZEPHIR.xlsm' (PHP	PP version	: 9.3)
EnerPHit Retrofit Plan: Community Center, La Providenza, Pergine-Va Retrofit step No.	Ilsugana, IT-Italy	2-Step 1 - Passivhaus	3-Step 2 - Addition of					
Year	1998	2014-2016	renewables 2025					
	1330	2014-2016	2023					
Measures		Roof - EPS insulation 100 mm						
Occasion ("anyway measure") 1		(minimal requriment) Ceilings - PUR Insulation 60 mm (minimal requirement)						
Energy-saving measure		Roof - Additional EPS Insulation up to 340 mm + Thermal Bridge Correction Ceilings - Additional PUR Insulation up to 200 mm	PV integrated Facade + Roof PV					
Occasion ("anyway measure") 2		Exterior Wall - EPS insulation 100 mm (minimal requriment) + Exterior Plaster + Glue + Fixing + Plasterboard						
Energy-saving measure		Exterior Wall -Additional EPS Insulation up to 250 mm + Additional Mineral Whool Internal Insulation						
Occasion ("anyway measure") 3		Ground Wall - XPS insulation 100 mm (minimal requriment)						
Energy-saving measure		Ground Wall - Additional XPS Insulation up to 300 mm						
Occasion ("anyway measure") 4		Windows - Standard Windows and skylight						
energy-saving measure		Windows - Passivhaus Windows and skylight						
Occasion ("anyway measure") 5		Ventilation and heating - Radiators + District Heating Connection + Heating Distribution Pipes						
energy-saving measure		Ventilation and heating - Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + Heating Distribution Pipes + Pre/Post Heating Colis + Ventilation System Assesment						
Occasion ("anyway measure") 6	•	-						ria
energy-saving measure		Airtightness - Additional measures + BD Test						rite
Occasion ("anyway measure") 7		-						veo
energy-saving measure		Floor Slab - PUR Insulation 150 cm					ria	Alternative criteria
Occasion ("anyway measure") 8		Other Costs					Criteria	lter
energy-saving measure							U	٩
Component characteristics	1	1	1	1	1	1		
Wall to ambient air, ext. insulation (U-value) [W/(m ² K)] Roof (U-value) [W/(m ² K)]		0.12 0.10	0.12					
Roof (U-value) [W/(m²K)] Building envelope to ambient (U value) [W/(m²K)]		0.10	0.10				-	-
Wall to ground, ext. insulation (U-value) [W/(m²K)]		0.11	0.11					-
Basement ceiling / floor slab (U-value) [W/(m ² K)]	4.59	0.17	0.17					
Building envelope to ground (U-value) [W/(m ² K)]	3.23	0.16	0.16				-	-
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/(m ² K)]		45.20	45.20				-	-
Inclined and vertical external surface (SRI) [W/(m²K)]		49	49				-	-
Windows / doors (U _{installed}) [W/(m²K)] Windows (U _{W.installed}) [W/(m²K)]	3.62	0.95	0.95				-	-
Windows (U _{W,installed}) [W/(m²K)] [W/(m²K)]		-	-				-	-
Glazing (g-value)	0.87	0.54	0.54				-	-
Glazing/sun protection (max. solar load) [kWh/(m²a)]	172	59	59				╢┷┦	-
Ventilation (effective heat recovery efficiency) [%] Ventilation (effective humidity recovery		81	81				-	-
efficiency) [70]		0	0					-
Airchange at press. test n ₅₀ [1/h]	10.0	0.3	0.3				0.6	-
Building characteristics								
Heating demand [kWh/(m²a)]	283	13	13				15	-
Heating load [W/m ²] Cooling + dehumidification demand [kWh/(m ² a)]	-	9	9				·	10
Cooling load [kWh/(m²a)]		-	-				-	-
Frequency of overheating (> 25 °C) [%]	0	7	7				10	-
Frequency of exc. high humidity (> 12 g/kg) [%]	0	0	0				20	-
Non-renewable primary energy (PE demand) [kWh/(m²a)]		83	83				-	-
Renewable primary energy (PER demand) [kWh/(m²a)] Renewable primary energy generation	693	51	51				60	60
(reference to projected building footprint) [kWh/(m²a)]	0 no	16 yes	49 yes				<u> - </u>]	-
Costs					1		_ 	
Energy-related invest. (interest+repayment) [€/year]	0	4978	10666				1	
Expected energy costs		10100	10100				1	
(total of all energy use in the building) [€/year] Total cost (investment+energy) [€/year]		15078	20766				1	
	00000	15070	20100	1	1	1	1	

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Retrofit step No. Year	1-Existing 1998	2-Step 1 - Passivhaus 2014-2016	renewables 2025			
lear	1990	100 mm (minimal	2023			
		reguriment)				
Occasion ("anyway measure")		Ceilings - PUR Insulation 60 mm				
Investment costs Maintenance costs		4,869 €				
		Roof - Additional EPS Insulation up to 340				
		mm + Thermal Bridge Correction				
		Ceilings - Additional	PV integrated Facade +			
Energy-saving measure Investment costs		PUR Insulation up to 17,340 €	Roof PV 104,800 €			
Financial support (present value)						
Maintenance costs Service life [years]		65	25			
Present value factor Annuity factor	0€ 0€	32 € 0 €	18 € 0 €	0 € 0 €	0€ 0€	0 € 0 €
Annuity ("anyway measure")	0€	152 €	0€	0€	0€	0€
Annuity (Energy saving measure) Annuity (energy-related)	0 € 0 €	542 € 390 €	5,688 € 5,688 €	0€ 0€	0 € 0 €	0 € 0 €
Annuity (energy-related)	Ve		5,000 €	VE	U C	
Occasion ("anyway measure")		Exterior Wall - EPS insulation 100 mm (minimal requriment) + Exterior Plaster + Glue + Fixing + Plasterboard				
Investment costs Maintenance costs		126,087 €				
Energy-saving measure		Exterior Wall - Additional EPS Insulation up to 250 mm + Additional Mineral Whool Internal Insulation				
Investment costs		157,481 €				
Financial support (present value) Maintenance costs						
Service life [years]	0€	60 31 €	0€	0€	0€	0€
Present value factor Annuity factor	0€	0€	0€	0€	0€	0€
Annuity ("anyway measure") Annuity (Energy saving measure)	0 € 0 €	4,079 € 5.095 €	0€ 0€	0€ 0€	0€ 0€	0 € 0 €
Annuity (chergy-related) Occasion ("anyway measure")	0€	1,016 € Ground Wall - XPS insulation 100 mm (minimal reguriment)	0 €	0€ 0€	0€	0 €
Investment costs		4,077 €				
Maintenance costs		Ground Wall - Additional XPS Insulation up to 300 mm				
Investment costs		12,230 €				
Financial support (present value) Maintenance costs						
Service life [years]	0€	60 31 €	0€	0€	0€	0€
Present value factor Annuity factor	0€	31€ 0€	0€	0€	0€	0€
Annuity ("anyway measure")	0€ 0€	132 € 396 €	0 € 0 €	0 € 0 €	0 € 0 €	0€ 0€
Annuity (Energy saving measure) Annuity (energy-related)	0€ 0€	396 € 264 €	0€ 0€	0€ 0€	0€ 0€	0€ 0€
Occasion ("anyway measure") Investment costs Maintenance costs		Windows - Standard Windows and skylight 81,875 €				
Energy-saving measure Investment costs		Windows - Passivhaus Windows and skylight 104,265 €				
Financial support (present value) Maintenance costs						
Service life [years]		35		2.5	0.0	
Present value factor Annuity factor	0 € 0 €	23 € 0.0 €	0 € 0 €	0 € 0 €	0 € 0 €	0 € 0 €
Annuity ("anyway measure") Annuity (Energy saving measure)	0 € 0 €	3,537 € 4,505 €	0 € 0 €	0 € 0 €	0 € 0 €	0 € 0 €
Annuity (energy-related)	0€	967 €	0€	0€	0€	0€
Occasion ("anyway measure")		Ventilation and heating Radiators + District Heating Connection + Heating Distribution Pipes 91,482 €				
Maintenance costs Energy-saving measure		Ventilation and heating Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection +				
Maintenance costs Energy-saving measure Investment costs		Additional Costs for: Ventilation Units + Distribution ventilation ducts + District				
Maintenance costs Energy-saving measure Investment costs Financial support (present value) Maintenance costs		Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + 119,017 €				
Maintenance costs Energy-saving measure Investment costs Financial support (present value) Maintenance costs Service IIfe [years] Present value factor	0€	Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + 119,017 € 20 16 €	0€	0€	0€	0€
Maintenance costs Energy-saving measure Investment costs Financial support (present value) Maintenance costs Service life (years) Present value factor Annuity factor Annuity factor	0€	Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + 119,017 \in 20 16 \in 0 \in	0€	0€	0€	0€
Maintenance costs Energy-saving measure Investment costs Financial support (present value) Maintenance costs Service life (yers) Present value factor Annuity (cargor yaving measure) Annuity (cargor yaving measure)	0 € 0 € 0 €	Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + 19,017 € 20 16 € 0 € 5,868 € 7,835 €	0 € 0 € 0 €	0 € 0 € 0 €	0€ 0€ 0€	0 € 0 € 0 €
Maintenance costs Energy-saving measure Investment costs Francical support (present value) Maintenance cost Service life (years) Present value factor Annuthy (ansyme yearsure) Annuthy (crestyr-valued) Annuthy (crestyr-valued)	0€	Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + 119,017 € 20 16 € 0 € 5,868 €	0€ 0€	0€ 0€	0 € 0 €	0€
Maintenance costs Energy-saving measure Investment costs Francrid support (present value) Maintenance costs Service file (prest) Present value factor Annuly (nergy saving measure) Annuly (nergy related) Occasion ("anyway measure") Newstment costs	0 € 0 € 0 €	Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + 19,017 € 20 16 € 0 € 5,868 € 7,835 €	0 € 0 € 0 €	0 € 0 € 0 €	0€ 0€ 0€	0 € 0 € 0 €
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Maintenance costs Energy-saving measure Investment costs Francial support (present value) Maintenance costs Service file (years) Present value factor Annuty (Tenstry related) Occasion ("anyway measure") Maintenance costs Maintenance costs Maintenance costs Maintenance costs Annuty (nergy-related) Occasion ("anyway measure") Annuty (censtry-related) Occasion ("anyway measure") Investment costs Present value factor Annuty (censtry-related) Occasion ("anyway measure") Investment costs Energy-saving measure") Annuty (censtry-related) Occasion ("anyway measure") Investment costs Energy-saving measure") Investment costs Energy-saving measure Investment costs Energy-saving measu	0 € 0 € 0 € 0 € 0 € - - - - - - - - - - - - -	$\begin{array}{c} \mbox{Additional Costs for:}\\ \mbox{Additional Costs for:}\\ \mbox{Venitation Venitation} venitation \\ \mbox{Venitation Venitation} \\ \mbox{Heat} < \mbox{District} \\ \mbox{Heat} < \mbox{Heat} \\ \mbox{Heat} < \mbox{District} \\ \mbox{Heat} \\ \mbox{Heat} < \mbox{District} \\ \mbox{Heat} \\ \mbo$	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0
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Maintenance costs Energy-taving measure Investment costs Francid support (present value) Maintenance costs Francid support (present value) Maintenance costs Francid support (any way measure) Annuity (cergy-related) Coccasion ("anyway measure") Investment costs Francid support (present value) Maintenance costs Francid support (present value) Mai	0 6 0 6 0 6 0 6 0 6 0 6 0 6 0 6	Additional Costs for: Venitation Units + Distribution venillation ducts + Distribution 119,017 € 20 10 € 0 € 0 € 10 € 0 € 10 € 10 € 0 € 10 € 10 € 0 € 1,766 € 1,766 € 2 Airtightness - Additional messures + B0 Test 0 € 138 € 1 138 € 1 138 € 0 € 138 € 1 32 € 0 € 436 € Other Costs 1,331,117 € 40	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0
Maintenance costs Energy-saving measure Investment costs Francial support (present value) Maintenance costs Service to Value and Francial support (present value) Maintenance costs Energy-saving measure) Annulty (cergy-related) Occasion ("anyway measure") Annulty (cergy-related) Maintenance costs Energy-saving measure Investment costs Energy-saving measure Annulty (cergy-related) Coccasion ("anyway measure") Investment costs Energy-saving measure Investment costs Energy-saving meas	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	Additional Costs for: Ventilation Units + Distribution ventilation ducts + District Heating Connection + 119,017 € 20 16 € 0.6 5,606 € 7,635 € 1,766 € - Airtightness - Additional measures + BD Test 20 40 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0
Maintenance costs Energy-saving measure Investment costs Francrid support (present value) Maintenance costs Annuthy (inverse yreang measure) Annuthy (core gy-related) Cocasion ("anyway measure") Annuthy (core gy-related) Cocasion ("anyway measure") Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Investment costs Investment costs Investment costs Investment costs Investment cost	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	Additional Costs for: Venitation Units + Distribution venitiation ducts + Distribution venitiation ducts + Distribution 20 16 € 5.808 € 7.838 € 1.768 € 1.778 € 1.77	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0
Maintenance costs Energy-taving measure Investment costs Francial support (present value) Maintenance costs Service tile (years) Present value factor Annuty (centry value) Maintenance costs Service tile (years) Present value factor Annuty (centry value) Maintenance costs Energy-saving measure) Annuty (centry value) Maintenance costs Energy-saving (cesent value) Maintenance costs Service tile (years) Present value factor Annuty (centry value facto	0 6 0 6 0 6 0 6 0 6 0 6 0 6 0 6	Additional Costs for: Venitation Units + Distribution venillation ducts + Distribution 119,017 € 20 10 € 0 10 € 0 € 10 € 0 € 10 € 0 € 10 € 0 € 10 € 0 € 1,766 € 1 20 Test 0 € 0 € 138 € 0 € 138 € 138 € 133,951 € 133,951 € 133,911 € 0 € 1,331,117 € 40 25 € 0 € 1,331,117 € 40 25 € 0 € 1,331,27 €	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0
Maintenance costs Energy-saving measure Investment costs Francrid support (present value) Maintenance costs Annuthy (inverse yreang measure) Annuthy (core gy-related) Cocasion ("anyway measure") Annuthy (core gy-related) Cocasion ("anyway measure") Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Annuthy (core gy-related) Cocasion ("anyway measure") Investment costs Energy-saving measure Investment costs Investment costs Investment costs Investment costs Investment cost	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	Additional Costs for: Venitation Units + Distribution venitiation ducts + Distribution venitiation ducts + Distribution 20 16 € 5.808 € 7.835 € 1.768 € 1.778 € 1.77	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0 € 0 € 0 € 0 € 0 € 0 € 0 € 0 €	0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0€ 0

Building ass		•	es)	e: 'PHPP_V9.3a_EN_C	DP24_Provvidenza_ZEPH	IR.xlsm' (PHPP version:	9.3)
		01ud-Muro 01				rea: 81.0 m ²	
Areas with th				, -1_Muro 01	A - S - (E), -1		N -
	Retrofit step:	2-Step 1 - Passivhaus	5		2014-2016		
Subarea 1	l [W/(mK)]	Subarea 2 (optional)	[[W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]	
Muratura in pietra	1.800					700	
XPS - Styrodur 3035CS	0.038					300	
Intonaco	0.900					10	
				-			
F	raction subarea 1	1	Fraction subarea	2	Fraction subarea 3	Total 101.0 cm	
	100%		0%		0%		
U-value supplemen		W/(m²K)			U-va	w/(m	n²K)
preparation for subseque	-	1					
FACADE INTEGRATED PV MO	DULES	Prepare supports	for future instal	lation of the PV mo	deules on the facade		
	Retrofit step:						
Subarea 1	I [W/(mK)]	Subarea 2 (optional)	[W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]	
F	raction subarea 1		Fraction subarea 2	2	Fraction subarea 3	Total	
	100%]	0%	1	0%	cm	
]					
U-value supplemen		W/(m²K)			U-va	w/(m	n²K)
preparation for subseque	nt steps:						

Building ass				: 'PHPP_V9.3a_EN_OP24_	Provvidenza_ZEP	IIR.xlsm' (PHPP version: 9.3)
		07ud-Muro 07 (N)			Δ	.rea: 117.1 m ²
Areas with th						
	Retrofit step:	2-Step 1 - Passivhaus			2014-2016	
Subarea 1	[[W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
Parete in c.a.	2.200					300
Lana di Toccia - Rockwooi	0.035	C75x100	30.000			100
Bana di roctia - Kockwoor	0.035					150
Cartongesso	0.210					25
F	raction subarea 1	Frac	tion subarea 2	1	Fraction subarea 3	Total
	99%		1%]	0%	57.5 cm
U-value supplemen preparation for subseque		JW/(m²K)			U-va	lue:W/(m²K)
FACADE INTEGRATED PV MOI	DULES	Prepare supports for fut	ure install	ation of the PV modeul	es on the facade	
	Detection					
	Retrofit step:					
Subarea 1	l [W/(mK)]	Subarea 2 (optional)	l [W/(mK)]	Subarea 3 (optional)	l [W/(mK)]	Thickness [mm]
F	raction subarea 1	Frac	tion subarea 2		Fraction subarea 3	Total
	100%]	0%]	0%	cm
U-value supplemen	t	W/(m²K)]	U-va	lue: W/(m²K)
preparation for subseque		w/(III-IX)			0-va	
preparation for subseque	ni sieps.					

Window (glazing and frame)

Eller Hit Kettolit Flan. Community Center	, La FIUVIUEIIZA, FEI	gine-valsugana, n-naiy			
	Window type:	a-Fin A dx		Fläche: 24.066112	25 m²
Retrofit step	Year	Glazing	Ug	Frame	U _f
2-Step 1 - Passivhaus	2014-2016	03ud-Vetro facciata Sud/Est/Ovest - Glasstrosch	0.7	07ud-Finestra A dx	1.0222
preparation for subsequent steps:	·				
Retrofit step	Year	Glazing	Ug	Frame	U _f
•					
preparation for subsequent steps:				L	

Retrofit step	Year	Glazing	Ug	Frame	U _f
preparation for subsequent steps:					
Advice					
Advice Plan / sketch / image					
Description					

Ventilation	imunity Center. La	-rovidenza, Perdine-Val	sugana, 11-Italy			
Retrofit step	Unit no.		Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric
Step 1 - Passivhaus	2014-2016					
			01ud-Zehnder -	85%	0%	0.41
	1		ComfoAir XL3300			
	2		02ud-Zehnder - ComfoAir350, ComfoD350, WHR930	84%	0%	0.29
	3		03ud-Zehnder - ComfoAir200, ComfoD250, WHR920	92%	0%	0.42
	4					
	5					
	6					
	7					
	8					
	9					
	10					
reparation for subseq						
Retrofit step	Unit no.		Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric
	1					
	2					
	3					
	4					
	5					
	7					
	8					
	9					
	10					
	10					
reparation for subseq	uent stens:					
reparation for subseq	uent steps:					
eparation for subseq	uent steps:					
reparation for subseq	uent steps:					
reparation for subseq	uent steps:					
reparation for subseq	uent steps:					
reparation for subseq	uent steps:					
eparation for subseq	uent steps:					
eparation for subseq	uent steps:					
reparation for subseq	uent steps:					

Retrofit step	Unit No.		Ventilation unit	Heat recovery efficiency	recovery efficiency	efficiency
				T		
	1					
	2					
	3					
	4					
	5					
	6	-				
	7	-				
	8	-				
	9	-				
	10					
preparation for subseq	uent steps:					
Advice ventilation sy	stems					
Plan / sketch / image						
Description						

		Source Source nunity Center, La Providenza, Pergine-Valsu	e file: 'PHPP_V9.3a_EN_OP24_Provvide	nza_ZEPHIR.xlsm' (F	HPP version: 9.3)
	Retrofit step:	2-Step 1 - Passivhaus	gana, m-naiy	2014-2016	
	Retroit step.	Туре	Туре	Heating fraction	DHW fraction
_	Primary heat			_	
Heating	generator	3-District heating, CGS	20-Gas CGS 70% PHC	100%	64%
Hea	Secondary heat generator	6-Direct electrical (heating resistance / continuous flow water heater)	-	0%	36%
		used?	Seasonal performance factor		
	Supply air cooling	-	<u> </u>		
Cooling	Recirculatio cooling	-	-		
Ũ	Additional	_	_		
	dehumidification				
	Panel Cooling	-	-		
pre	eparation for subseque	ent steps:			
_	Detrofit store				
	Retrofit step:	T	T	lite a the set for a three	DI MA Constitue
5	Dubu and the st	Туре	Туре	Heating fraction	DHW fraction
Heating	Primary heat				
Lea	generator Secondary heat				
-	generator				
	generator	used?	0		
ō	Supply air cooling		Seasonal performance factor	_	
	Supply air cooling		Seasonal performance factor	-	
Coolir	Recirculatio cooling		Seasonal performance factor	-	
Cooling	Recirculatio cooling Additional		Seasonal performance factor	-	
Coolir	Recirculatio cooling Additional dehumidification		Seasonal performance factor	-	
	Recirculatio cooling Additional dehumidification Panel Cooling		Seasonal performance factor	-	
	Recirculatio cooling Additional dehumidification		Seasonal performance factor	-	
	Recirculatio cooling Additional dehumidification Panel Cooling		Seasonal performance factor	-	
	Recirculatio cooling Additional dehumidification Panel Cooling		Seasonal performance factor		
	Recirculatio cooling Additional dehumidification Panel Cooling		Seasonal performance factor		
	Recirculatio cooling Additional dehumidification Panel Cooling				
	Recirculatio cooling Additional dehumidification Panel Cooling		Seasonai performance factor		
	Recirculatio cooling Additional dehumidification Panel Cooling				
	Recirculatio cooling Additional dehumidification Panel Cooling				

	Retrofit step:				
		Kind	Туре	Heating fraction	DHW fraction
Heating	Primary heat				
eati	generator				
Ť	Secondary heat				
	generator				
		used?	Seasonal performance factor		
	Supply air cooling				
Cooling	Recirculatio cooling				
ŏ	Additional				
	dehumidification				
	Panel Cooling				
pre	paration for subseque	ent steps:			

Advice Heating & cooling		
Plan / sketch / image		
Description		

Photovoltaics		Source file: 'PHPP_	V9.3a_EN_OP24_Provvide	nza_ZEPHIR.xl	lsm' (PHPP version: 9.3)
EnerPHit Retrofit Plan: Community Center,	La Providenza, Pergine-Valsu	gana, IT-Italy			
				Annual electricity yield after inverter	
Step	Technology	Module field area [m²]	Location	absolute [kWh/a]	reference to projected building footprint [kWh/ (m² _{projected} a)]
2-Step 1 - Passivhaus	Poly-Si	46.95	Roof	8212.00	11.90
preparation for subsequent steps:					
				Annual e	electricity yield after inverter
Step	Technology	Module field area [m²]	Location	absolute [kWh/a]	reference to projected building footprint [kWh/ (m ² _{projected} a)]
3-Step 2 - Addition of renewables	Amorph-Si	204.76	Facade	8547.00	12.40
preparation for subsequent steps:					

				Annual electricity yield after inverter	
Step	Technology	Module field area [m²]	Location	absolute [kWh/a]	reference to projected building footprint [kWh/ (m ² projecteda)]
3-Step 2 - Addition of renewables	Poly-Si	71.41	Roof	14141.00	20.50
preparation for subsequent steps:	-				

dvice Photovoltaics	
an / sketch / image	
escription	



Technical References

Project Acronym	EuroPHit	
Project Title	Improving the energy performance of step-by-step refurbishment and integration of renewable energies	
Project Coordinator	Jan Steiger Passive House Institute, Dr. Wolfgang Feist Rheinstrasse 44/46 D 64283 Darmstadt jan.steiger@passiv.de	
Project Duration	1 April 2013 – 31March 2016 (36 Months)	

Deliverable No.	D3.9
Dissemination Level	PU
Work Package	WP3_Practical Implementation
Lead beneficiary	04_MosArt
Contributing beneficiary(ies)	02_ZEPHIR
Author(s)	Francesco Nesi, Fabio Ferrario, Marco Larcher
Co-author(s)	
Date	25/03/2016
File Name	EuroPHit_D3.9_OP24_Providenza_ZEPHIR

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