



EuroPHit



D3.9_Overall Refurbishment Plan



OP21_Family Home, Wicklow, Ireland

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



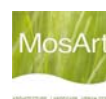
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Programme of the European Union

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 – 31 March 2016 (36 Months)

Deliverable No.	D3.9
Dissemination Level	PU
Work Package	WP3_Practical Implementation
Lead beneficiary	04_MosArt
Contributing beneficiary(ies)	CB4, MosArt
Author(s)	Mariana Moreira
Co-author(s)	Art McCormack
Date	26 03 2016
File Name	EuroPHit_D3.9_OP21_FamilyHome_Wicklow.doc

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EnerPHit Retrofit Plan

Target standard: EnerPHit Plus

EuroPHit



Object:	OP21 Stella Maris		
Street:	Ballyguile Beg		
Postcode/city:		End-of-terrace Passive House	
Province/country:	Wicklow	Passivhaus-Reihenendhaus	
Object type:	Residential		
Climate data set:	IE0001a-Dublin		
Climate zone:	3: Cool-temperate	Altitude of location:	107

Owner:	Art McCormack		
Street:	Ballyguile Beg		
Postcode/city:		Wicklow	
Province/country:	Wicklow	IE-Ireland	

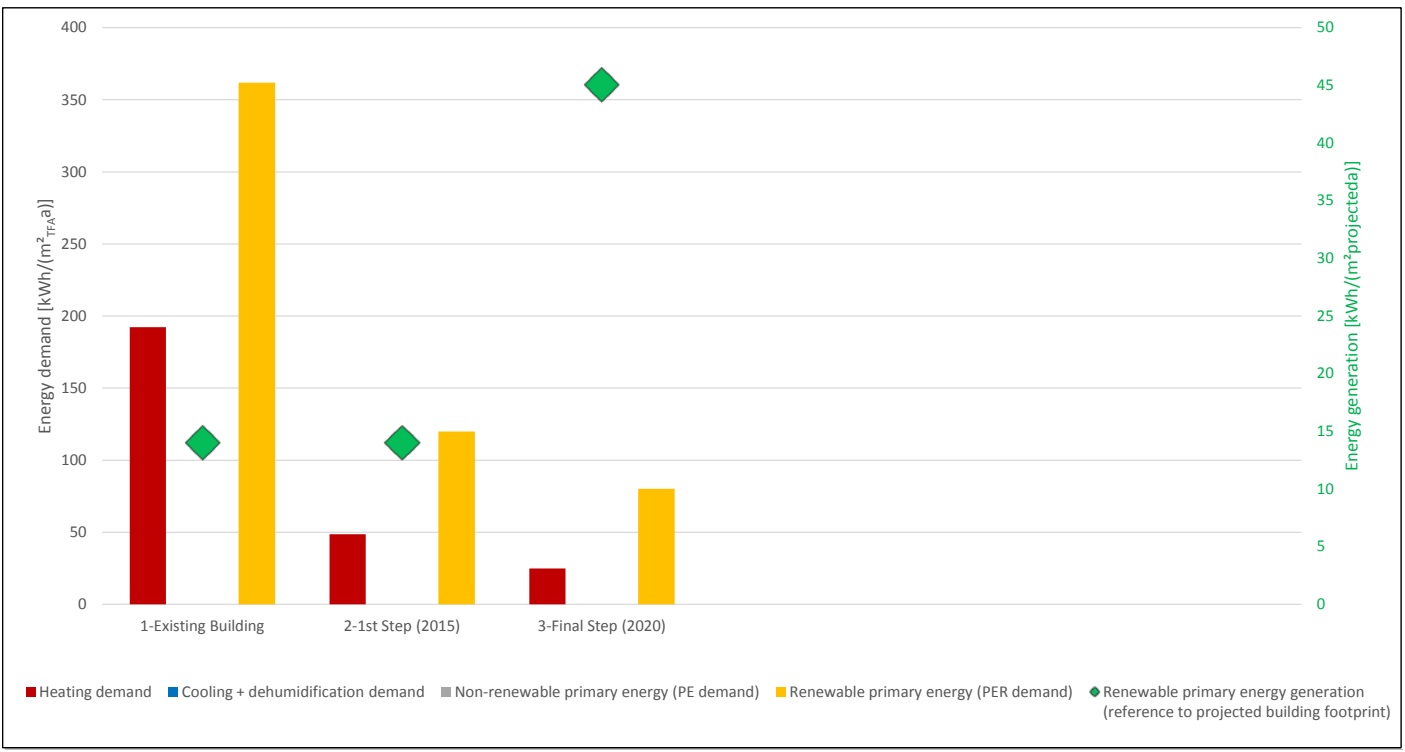
Architecture:	MosArt Architects		
Street:	Block 6 Broomhall Business Park		
Postcode/city:		Wicklow	
Province/country:	Wicklow	IE-Ireland	

Tech. systems:			
Street:			
Postcode/city:			
Province/country:			

Energy consulting:	MosArt Architects		
Street:	Block 6 Broomhall Business Park		
Postcode/city:		Wicklow	
Province/country:	Wicklow	IE-Ireland	

Certification:	EuroPHit		
Street:			
Postcode/city:			
Province/country:			

Year of construction:	2016	Interior temp. winter [°C]:	20.0	Interior temp. summer [°C]:	25.0
Number of dwelling units:	1	Treated floor area:	147.1	No. of occupants:	2.9



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	Mariana	Last name	Moreira	Signature
Company	MosArt	Issued (date)	31.03.2016	City
			Wicklow	

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!

Mariana Moreira (MosArt)

Scheduler

Source file: 'PHPP_V9.3a_EN_OP21_ERP_beta.xlsm' (PHPP version: 9.3)

EnerPHit Retrofit Plan: OP21 Stella Maris, Wicklow, IE-Ireland

Retrofit steps:		1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065
Assemblies	Last renewal																								
County Council Cottage	1960																								
Refurbishment and Extension	1995																								
New Boiler & Solar System	2009																								
Roof Refurbished (insulation & airtight)	2015																								
Front Wall Insulation	2015																								
Windows & Door to Front Wall	2015																								
Roof windows	2015																								
Ventilation	2015																								
East+West+South Facades	2020																								
Windows to E+W+S Facades	2020																								
PV Panels	2020																								
Airtightn. test: X, Leakage search: (X)														x	x										

Initial condition
 Main-tenance
 Extensive Repairs

Retrofit dates
 Smaller Repairs
 Immediate replacement

Overview of measures

Source file: 'PHPP_V9.3a_EN_OP21_ERP_beta.xlsm' (PHPP version: 9.3)

EnerPHit Retrofit Plan: OP21 Stella Maris, Wicklow, IE-Ireland

Retrofit step No.	1-Existing Building	2-1st Step (2015)	3-Final Step (2020)			
Year	1990s	2015	2020			
Measures						
Occasion ("anyway measure")	1	Roof Refurbishment	East + West + South Facades			
Energy-saving measure						
Occasion ("anyway measure")	2	Roof Windows	East + West + South Windows & Doors			
Energy-saving measure						
Occasion ("anyway measure")	3	Front Wall Insulation	PV Panels			
Energy-saving measure						
Occasion ("anyway measure")	4	Front Wall Windows				
Energy-saving measure						
Occasion ("anyway measure")	5	Ventilation				
Energy-saving measure						
Occasion ("anyway measure")	6					
Energy-saving measure						
Occasion ("anyway measure")	7					
Energy-saving measure						
Occasion ("anyway measure")	8					
Energy-saving measure						
Component characteristics						
Wall to ambient air, ext. insulation (U-value)	[W/(m²K)]	0.62	0.23	0.12		
Roof (U-value)	[W/(m²K)]	0.20	0.12	0.12		
Building envelope to ambient (U value)	[W/(m²K)]	0.46	0.18	0.12		
Wall to ground, ext. insulation (U-value)	[W/(m²K)]					
Basement ceiling / floor slab (U-value)	[W/(m²K)]	0.58	0.58	0.56		
Building envelope to ground (U-value)	[W/(m²K)]	0.58	0.58	0.56		
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)]	71.91	-	-		
Inclined and vertical external surface (SRI)	[W/(m²K)]	61	50	51		
Windows / doors (U _{installed})	[W/(m²K)]	2.64	1.08	0.95		
Windows (U _{W,installed})	[W/(m²K)]	3.01	0.71	0.71		
Windows (U _{W,installed})	[W/(m²K)]	3.01	0.71	0.71		
Glazing (g-value)	[]	0.77	0.59	0.60		
Glazing/sun protection (max. solar load)	[kWh/(m²a)]	400	251	174		
Ventilation (effective heat recovery efficiency)	[%]		92	92		
Ventilation (effective humidity recovery efficiency)	[%]		0	0		
Airchange at press. test n ₅₀	[1/h]	5.8	2.4	1.0		
Building characteristics						
Heating demand	[kWh/(m²a)]	192	49	25		25
Heating load	[W/m²]	59	22	14		-
Cooling + dehumidification demand	[kWh/(m²a)]	-	-	-		-
Cooling load	[kWh/(m²a)]	-	-	-		-
Frequency of overheating (> 25 °C)	[%]	0	0	0		10
Frequency of exc. high humidity (> 12 g/kg)	[%]	0	0	0		20
Non-renewable primary energy (PE demand)	[kWh/(m²a)]					-
Renewable primary energy (PER demand)	[kWh/(m²a)]	362	120	80		55
Renewable primary energy generation (reference to projected building footprint)	[kWh/(m²a)]	14	14	45		70
						60
						81
Criteria fulfilled for EnerPHit Plus?						
		no	no	no		
Costs						
Energy-related invest. (interest+repayment)	[€/year]	0	0	0		
Expected energy costs (total of all energy use in the building)	[€/year]	3100	1400	1200		
Total cost (investment+energy)	[€/year]	3100	1400	1200		

Criteria
Alternative criteria

Investment and maintenance costs

Source file: 'PHPP_V9.3a_EN_OP21_ERP_beta.xlsm' (PHPP version: 9.3)

EnerPHit Retrofit Plan: OP21 Stella Maris, Wicklow, IE-Ireland

Retrofit step No. Year	1-Existing Building 1990s	2-1st Step (2015) 2015	3-Final Step (2020) 2020			
1 Occasion ("anyway measure")		Roof Refurbishment	East + West + South Facades			
Investment costs		19,300 €				
Maintenance costs						
Energy-saving measure						
Investment costs		13,700 €				
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
2 Occasion ("anyway measure")		Roof Windows	East + West + South Windows & Doors			
Investment costs		6,490 €				
Maintenance costs						
Energy-saving measure						
Investment costs		6,060 €				
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
3 Occasion ("anyway measure")		Front Wall Insulation	PV Panels			
Investment costs		7,700 €				
Maintenance costs						
Energy-saving measure						
Investment costs						
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
4 Occasion ("anyway measure")		Front Wall Windows				
Investment costs		7,200 €				
Maintenance costs						
Energy-saving measure						
Investment costs						
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
5 Occasion ("anyway measure")		Ventilation				
Investment costs		8,500 €				
Maintenance costs						
Energy-saving measure						
Investment costs						
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
6 Occasion ("anyway measure")						
Investment costs						
Maintenance costs						
Energy-saving measure						
Investment costs						
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
7 Occasion ("anyway measure")						
Investment costs						
Maintenance costs						
Energy-saving measure						
Investment costs						
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
8 Occasion ("anyway measure")						
Investment costs						
Maintenance costs						
Energy-saving measure						
Investment costs						
Financial support (present value)						
Maintenance costs						
Service life [years]						
Present value factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity factor	0 €	0 €	0 €	0 €	0 €	0 €
Annuity ("anyway measure")	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (Energy saving measure)	0 €	0 €	0 €	0 €	0 €	0 €
Annuity (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
Total annuities (energy-related)	0 €	0 €	0 €	0 €	0 €	0 €
Cumulated sums	0 €	0 €	0 €	0 €	0 €	0 €

Boundary conditions:

Nominal interest rate: 3.0%

Inflation: 1.0%

Real interest rate: 2.0%

Assembly: 14ud-Existing Masonry Wall Advice

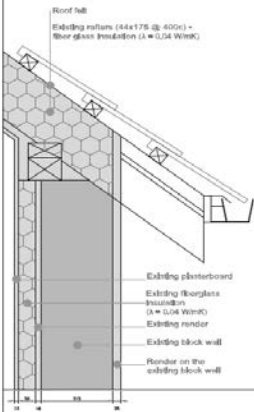
EuroPHit_OP21_MosArt_Family Home_Ireland

Scale: 1:10 @ A4
Author: Mariana Moreira
Date: 16.03.2016



R0EA01 | Eaves detail for masonry wall

EXISTING



1 STEP



- Windtight layer - Solignum Pflaster
- Rockwool (λ = 0,035 W/mK)
- Rockwool (λ = 0,035 W/mK)
- Airtight layer (dimpled)
- Existing rafters (44x175 @ 400c) insulated with mineral wool (λ = 0,034 W/mK)
- Existing rafters to be cut back flush with the outside existing wall
- Existing block wall
- Existing render
- Existing fibreglass insulation (λ = 0,04 W/mK)
- Existing plasterboard
- Airtight layer = external render on the existing block wall
- EPS (λ = 0,021 W/mK)
- Render

COLOR CODE

- Existing building
- Step 1
- Step 2
- Step 3
- Step 4
- temporary works (in between steps)
- Airtight layer
- Windtight layer

DESCRIPTION/CHALLENGES

In order to assure a continuous airtight lno, it has been decided to keep the airtight layer along the outside of the existing block wall as the existing render, and lay on the existing roof rafters an airtight membrane that will join the wall render at eaves and verge junctions.



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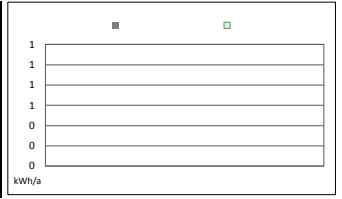
Description

Windows

OP21 Stella Maris / Climate: Dublin / TFA: 147 m² / Heating: 24.9 kWh/(m²a) / Freq. overheating: 0 % / PER: 80.1 kWh/(m²a)

Window area orientation	Global radiation (main orientations) kWh/(m ² a)	Shading	Dirt	Non-vertical radiation incidence	Glazing fraction	g-Value	Solar irradiation reduction factor	Window area m ²	Window U-Value W/(m ² K)	Glazing area m ²	Average global radiation kWh/a
Standard values →	124	0.83	0.95	0.85	0.63	0.54	0.42	12.15	0.83	7.65	168
North	241	0.79	0.95	0.85	0.50	0.62	0.32	4.69	1.00	2.37	185
East	404	0.61	0.95	0.85	0.69	0.62	0.34	21.35	0.85	14.73	386
South	250	0.47	0.95	0.85	0.54	0.62	0.20	3.44	1.01	1.86	312
West	383	1.00	0.95	0.85	0.00	0.00	0.00	0.00	0.00	0.00	383
Horizontal											
Total or average value for all windows.						0.60	0.35	41.63	0.87	26.60	

Transmission losses heating period kWh/a	Heating gains solar radiation heating period kWh/a
707	463
330	173
1272	1724
245	136
0	0
2554	2496



Heating degree hours [kK/h] **70.4**

[Go to glazing list](#)

[Go to window frames list](#)

Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge (Avg.)	Installation situation				Results				
					Width	Height					Selection from 'Areas' worksheet	Selection from 'Components' worksheet		Selection from 'Components' worksheet	Perpendicular radiation	Glazing	Frames (avg.)	Ψ _{casings} edge (Avg.)	left	right	bottom	top
0	WI-NNW-GF-1	335	90	North	0.530	1.350	1-W-NNW-GF-1	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	0	1	1	1	0.018				
0	WI-NNW-GF-2	335	90	North	0.570	1.350	1-W-NNW-GF-1	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	0	1	1	0.018				
0	WI-NNW-GF-3	335	90	North	0.664	1.350	1-W-NNW-GF-1	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	0	0	1	1	0.016				
0	WI-ENE-GF-1	65	90	East	0.490	0.950	2-W-ENE-GF-1	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-ENE-GF-2	65	90	East	0.590	0.950	4-W-ENE-GF-3	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-1	155	90	South	0.550	0.940	6-W-SSE-GF-2	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-2	155	90	South	0.550	1.135	6-W-SSE-GF-2	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-WSW-GF-1	245	90	West	0.560	1.240	7-W-WSW-GF-1	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-3	155	90	South	0.550	1.640	8-W-SSE-GF-3	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-4	155	90	South	0.550	1.860	8-W-SSE-GF-3	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-5	155	90	South	0.550	1.440	8-W-SSE-GF-3	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-WSW-GF-2	245	90	West	0.560	1.440	9-W-WSW-GF-2	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-6	155	90	South	0.550	1.440	10-W-SSE-GF-4	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-7	155	90	South	0.550	1.640	10-W-SSE-GF-4	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-GF-8	155	90	South	0.550	1.640	10-W-SSE-GF-4	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-WSW-GF-3	245	90	West	0.560	1.530	12-W-WSW-GF-4	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-WSW-GF-4	245	90	West	1.040	2.280	11-W-WSW-GF-3	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-NNW-FF-1	355	38	North	1.360	1.280	35-Sloped Roof	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.017				
0	WI-NNW-FF-2	355	38	North	0.860	1.080	35-Sloped Roof	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-ENE-FF-1	65	90	East	0.550	0.950	15-W-ENE-FF-5	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-ENE-FF-2	65	90	East	0.550	0.950	16-W-ENE-FF-6	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-FF-1	155	90	South	0.550	0.810	17-W-SSE-FF-5	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-FF-2	155	90	South	0.550	1.190	17-W-SSE-FF-5	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-WSW-FF-1	245	90	West	0.560	1.105	19-W-WSW-FF-6	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-FF-3	155	90	South	0.550	0.810	20-W-SSE-FF-7	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-FF-4	155	90	South	0.550	1.190	20-W-SSE-FF-7	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-WSW-FF-2	245	90	West	0.560	1.105	21-W-WSW-FF-7	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-FF-5	155	90	South	0.550	0.810	22-W-SSE-FF-8	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-FF-6	155	90	South	0.550	1.190	22-W-SSE-FF-8	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-WSW-FF-3	245	90	West	0.675	1.105	23-W-WSW-FF-8	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018				
0	WI-SSE-FF-7	155	38	South	0.850	1.116	54-roof win to closet	03ud-roof glass	05ud-VELUX - GGU -008230 -	0.40	0.30	0.70	0.024	1	1	1	1	0.049				
1	Win_177259_N	334.8	38.5	North	1.140	1.180	37-Roof_176892_N	03ud-roof glass	05ud-VELUX - GGU -008230 -	0.40	0.30	0.69	0.024	1	1	1	1	0.049	1.3	0.87	0.67	65%
1	Win_177263_N	334.8	38.5	North	1.140	1.180	37-Roof_176892_N	03ud-roof glass	05ud-VELUX - GGU -008230 -	0.40	0.30	0.69	0.024	1	1	1	1	0.049	1.3	0.87	0.67	65%
1	Win_177267_N	334.8	38.5	North	0.780	1.180	37-Roof_176892_N	03ud-roof glass	05ud-VELUX - GGU -008230 -	0.40	0.30	0.70	0.024	1	1	1	1	0.049	0.9	0.53	0.75	58%
1	Win_177271_N	334.8	38.5	North	0.780	1.180	37-Roof_176892_N	03ud-roof glass	05ud-VELUX - GGU -008230 -	0.40	0.30	0.70	0.024	1	1	1	1	0.049	0.9	0.53	0.75	58%
1	Win_177341_N	335	90	North	1.100	1.350	1-W-NNW-GF-1	02ud-Triple glazing internorm	03ud-Internorm sash HF310	0.62	0.60	0.86	0.036	0.025	0.025	0.044	0.025	0.029	1.5	0.98	0.88	66%
1	Win_177345_N	335	90	North	1.100	1.350	1-W-NNW-GF-1	02ud-Triple glazing internorm	03ud-Internorm sash HF310	0.62	0.60	0.86	0.036	0.025	0.025	0.044	0.025	0.029	1.5	0.98	0.88	66%
1	Win_177349_N	335	90	North	1.100	1.350	1-W-NNW-GF-1	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	0.025	0	0.044	0.025	0.031	1.5	1.14	0.84	76%
1	Win_177353_N	335	90	North	0.750	1.350	1-W-NNW-GF-1	02ud-Triple glazing internorm	03ud-Internorm sash HF310	0.62	0.60	0.86	0.036	0	0.025	0.044	0.025	0.030	1.0	0.59	0.91	58%
1	Win_177357_N	335	90	North	0.960	2.238	1-W-NNW-GF-1	05ud-glass to glazed door internorm	04ud-door internorm	0.62	0.60	1.01	0.036	0.025	0.025	0.044	0.025	0.028	2.1	1.16	0.96	54%
1	Win_177279_E	64.8	90	East	0.550	0.950	40-Wall_176871_E	02ud-Triple glazing internorm	03ud-Internorm sash HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018	0.5	0.23	0.99	44%
1	Win_177283_E	64.8	90	East	0.900	2.100	40-Wall_176871_E	05ud-glass to glazed door internorm	04ud-door internorm	0.62	0.60	1.01	0.036	1	1	1	1	0.056	1.9	0.97	1.07	51%
1	Win_177361_E	64.8	90	East	0.640	1.524	40-Wall_176871_E	02ud-Triple glazing internorm	03ud-Internorm sash HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018	1.0	0.53	0.92	55%
1	Win_177235_S	154.8	90	South	1.300	2.800	41-Wall_177325_S	02ud-Triple glazing internorm	02ud-Internorm fixed HF310	0.62	0.60	0.86	0.036	0	1	1	1	0.018	3.6	3.04	0.74	84%
1	Win_177369_S	154.8	90	South	0.975	2.800	41-Wall_177325_S	05ud-glass to glazed door internorm	04ud-door internorm	0.62	0.60	0.99	0.036	1	0	1						

Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		ψ Glazing edge	Installation situation				Results				
					Width	Height	Selection from 'Areas' worksheet	Selection from 'Components' worksheet	Selection from 'Components' worksheet	Perpendicular radiation	Glazing	Frames (avg.)	ψ Glazing edge (Avg.)	user determined value for ψ _{radiation} OF *1: ψ _{radiation} from 'Components' worksheet *0: in the case of shuttling windows.				Window Area	Glazing area	U _w installed	Glazed fraction per window	
					m	m		Sort: AS LIST	Sort: AS LIST	-	W/(m²K)	W/(m²K)	W/(mK)	left	right	bottom	top	ψ _{Installation} (Avg.)	m²	m²	W/(m²K)	%
1	Win_177395_S	154.8	90	South	0.975	2.000	41-Wall_177325_S	02ud-Triple glazing internorm	03ud-internorm sash HF310	0.62	0.60	0.86	0.036	0	1	1	1	0.018	2.0	1.32	0.81	68%
1	Win_177251_W	244.8	90	West	0.560	1.280	42-Wall_177149_W	02ud-Triple glazing internorm	03ud-internorm sash HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018	0.7	0.35	0.97	49%
1	Win_177255_W	244.8	90	West	0.900	2.100	42-Wall_177149_W	05ud-glass to glazed door internorm	04ud-door internorm	0.62	0.60	1.01	0.036	1	1	1	1	0.056	1.9	0.97	1.07	51%
1	Win_177998_W	244.8	90	West	0.560	1.480	42-Wall_177149_W	02ud-Triple glazing internorm	02ud-internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018	0.8	0.54	0.93	65%
1	Win_177275_E	64.8	90	East	0.490	0.950	44-Wall_177136_E	02ud-Triple glazing internorm	03ud-internorm sash HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018	0.5	0.19	1.02	41%
1	Win_177239_S	154.8	90	South	0.975	2.100	45-Wall_177129_S	02ud-Triple glazing internorm	06ud-Sliders	0.62	0.60	1.11	0.023	0	1	1	1	0.029	2.0	0.98	0.98	48%
1	Win_177243_S	154.8	90	South	0.975	2.100	45-Wall_177129_S	02ud-Triple glazing internorm	06ud-Sliders	0.62	0.60	1.11	0.023	1	0	1	1	0.029	2.0	0.98	0.98	48%
1	Win_177247_S	154.8	90	South	1.300	1.300	45-Wall_177129_S	02ud-Triple glazing internorm	02ud-internorm fixed HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018	1.7	1.32	0.81	78%
1	Win_177365_E	64.8	90	East	0.640	1.310	47-Wall_177288_E	02ud-Triple glazing internorm	03ud-internorm sash HF310	0.62	0.60	0.86	0.036	1	1	1	1	0.018	0.8	0.45	0.93	53%

Ventilation systems

Source file: 'PHPP_V9.3a_EN_OP21_ERP_beta.xlsm' (PHPP version: 9.3)

EnerPHit Retrofit Plan: OP21 Stella Maris, Wicklow, IE-Ireland

Retrofit step	Year	Ventilation type	Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
1-Existing Building	1990s	ventilation	-	-	-	-
preparation for subsequent steps:						

Retrofit step	Year	Ventilation type	Ventilation unit	Heat recovery efficiency	Humidity recovery efficiency	Electric efficiency
2-1st Step (2015)	2015	ventilation with HR	01ud-novus 300 - PAUL	0.93	0	0.24
preparation for subsequent steps:						

Advice



Description

Photovoltaics

EnerPHit Retrofit Plan: OP21 Stella Maris, Wicklow, IE-Ireland

Step	Technology	Module field area [m ²]	Location	Annual electricity yield after inverter	
				absolute [kWh/a]	reference to projected building footprint [kWh/(m ² _{projected} a)]
1-Existing Building					
preparation for subsequent steps:					

Step	Technology	Module field area [m ²]	Location	Annual electricity yield after inverter	
				absolute [kWh/a]	reference to projected building footprint [kWh/(m ² _{projected} a)]
3-Final Step (2020)					
preparation for subsequent steps:					

Step	Technology	Module field area [m ²]	Location	Annual electricity yield after inverter	
				absolute [kWh/a]	reference to projected building footprint [kWh/(m ² _{projected} a)]
preparation for subsequent steps:					

Advice Photovoltaics
Plan / sketch / image
Description