D3.4_PHPP Result Sheets

DRAFT

CS02

School, Ros Muc

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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Technical References

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Abstract

This overall refurbishment plan provides an overview of the retrofit steps of a step-by-step refurbishment to EnerPHit standard to be undertaken for the project School in Ros Muc.

First, the existing building will shortly be described, including building component and component conditions. In addition, the existing energy efficiency performance of the building will be described.

In a second step, the overall refurbishment plan will describe the retrofit steps to be undertaken until the refurbishment will finally be completed. The EnerPHit standard will be achieved through a sequence of refurbishment steps between 2014 and 2018. The proposed development, in essence, comprises a step-by-step expansion, retrofit and enclosure of open space that includes by default the elimination of many existing external walls by their becoming internal.

Figure 1: Areal view [MosArt, 2013]

1 Existing building: PHPP Result Sheet

1.1 PHPP Result sheet of the existing buildings

EnerPHit verification

Building:	Gairmscoil Na Bpiaisach-Main Building
Street:	Rosmuc, Galway
Postcode/City:	Galway
Country:	Ireland
Building type:	School
Climate:	[IE] - Birr
Altitude of building site (in [m] above sea level):	–
Home owner/client:	VEC
Street:	
Postcode/City:	
Architecture:	
Street:	
Postcode/City:	
Mechanical System:	
Street:	
Postcode/City:	
Energy consulting:	
Street:	
Postcode/City:	
Certification:	
Street:	
Postcode/City:	

ar of Construction:	1945	Interior temperature winter [C°]	19.0	Interior temp. summer [C°]	25.0
r of dwelling units:	1	Internal heat gains winter [W/m²]	2.8	IHG summer [W/m²]	2.8
ber of Occupants:	11.0			Spec. capacity [Wh/K per m² TFA]	132
Exterior vol. V_e:	1709.3 m³			Mechanical cooling:	

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	383.7	m²		
Space heating	Annual heating demand	316	kWh/(m²a)	25 kWh/(m²a)	no
	Heating load	102	W/m²	-	-
Space cooling	Overall specific space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	0.0	%	-	-
Primary Energy	Heating, cooling, dehumidifying, DHW,	418	kWh/(m²a)	481 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	399	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	10.0	1/h	1 1/h	no

* empty field: data missing; '-': no requirement

Figure 2: Specific energy efficiency values of the existing Main Building modelled with PHPP 9 Beta

Passive House verification

Building:	Gairmscoil Na Bpiaisach-Metalworks
Street:	Ros Muc, Galway
Postcode/City:	Galway
Country:	Ireland
Building type:	School
Climate:	[IE] - Birr
Altitude of building site (in [m] above sea level):	-
Home owner/client:	VEC
Street:	
Postcode/City:	

Architecture:		Mechanical System:	
Street:		Street:	
Postcode/City:		Postcode/City:	
Energy consulting:		Certification:	
Street:		Street:	
Postcode/City:		Postcode/City:	

Year of Construction:		Interior temperature winter [C°]	19.0	Interior temp. summer [C°]	25.0
Number of dwelling units:	1	Internal heat gains winter [W/m²]	2.8	IHG summer [W/m²]	2.8
Number of Occupants:	4.1			Spec. capacity [Wh/K per m² TFA]	132
Exterior vol. V_e:	658.1 m³			Mechanical cooling:	

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	142.5	m²		
Space heating	Annual heating demand	267	kWh/(m²a)	15 kWh/(m²a)	no
	Heating load	94	W/m²	10 W/m²	no
Space cooling	Overall specific space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	0.0	%	-	-
Primary Energy	Heating, cooling, dehumidifying, DHW.	397	kWh/(m²a)	120 kWh/(m²a)	no
	DHW, space heating and auxiliary electricity	346	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	10.0	1/h	0.6 1/h	no

* empty field: data missing; "-": no requirement

Figure 3: Specific energy efficiency values of the existing Metalworks modelled with PHPP 9 Beta

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Passive House verification

Building:	Gairmscoil Na Bpiaisach- Classroom
Street:	Ros Muc, Galway
Postcode/City:	Galway
Country:	Ireland
Building type:	School
Climate:	[IE] - Birr
Altitude of building site (in [m] above sea level):	–
Home owner/client:	VEC
Street:	
Postcode/City:	

Architecture:		Mechanical System:	
Street:		Street:	
Postcode/City:		Postcode/City:	
Energy consulting:		Certification:	
Street:		Street:	
Postcode/City:		Postcode/City:	

Year of Construction:			Interior temperature winter [C°]	19.0	Interior temp. summer [C°] 25.0
Number of dwelling units:	1		Internal heat gains winter [W/m²]	2.8	IHG summer [W/m²] 2.8
Number of Occupants:	1.5				Spec. capacity [Wh/K per m² TFA] 132
Exterior vol. V_e:	211.3	m³			Mechanical cooling:

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	53.3	m²*		
Space heating	Annual heating demand	253	kWh/(m²a)	15 kWh/(m²a)	no
	Heating load	84	W/m²	10 W/m²	no
Space cooling	Overall specific space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	0.0	%	-	-
Primary Energy	Heating, cooling, dehumidifying, DHW,	468	kWh/(m²a)	120 kWh/(m²a)	no
	DHW, space heating and auxiliary electricity	332	kWh/(m²a)	-	-

Figure 4: Specific energy efficiency values of the existing Classroom/Office modelled with PHPP 9 Beta

2 Retrofit steps

2.1 Overall refurbishment Plan

2.1.1 Retrofit steps:

The upgrading works will be initiated in 2014 and it is likely that they will be completed before 2018, depending on funding made available from the Department of Education and Skills as well as other national sources. The timeframe for the step-by-step works is provided below, allowing for some degree of flexibility in respect of monies being made available.

Step No.	Year	Measures	Specific Heating Demand	Specific Primary Energy Demand
1	1945 - 1960	Existing Buildings	316	418
2	2014	New Roof to Main Building & Metalwork Block, 4 new Classrooms	*150*	*280*
3	2016	External walls refurbished to all existing buildings and new roof to Classroom/Office. New Classrooms Built.	*115*	*250*
4	2016	Replacement of windows & doors	*93*	*220*
5	2016	Airtightness to 1 air changes per hour @ 50 Pa & MHRV installed	51	115
6	2016	Condensing Gas Boiler & new radiators installed	51	98
7	2018	Enclosure of central space to Passive House standard	18	56

Figure 5: Overview refurbishment steps

2.1.2 Efficiency Improvements

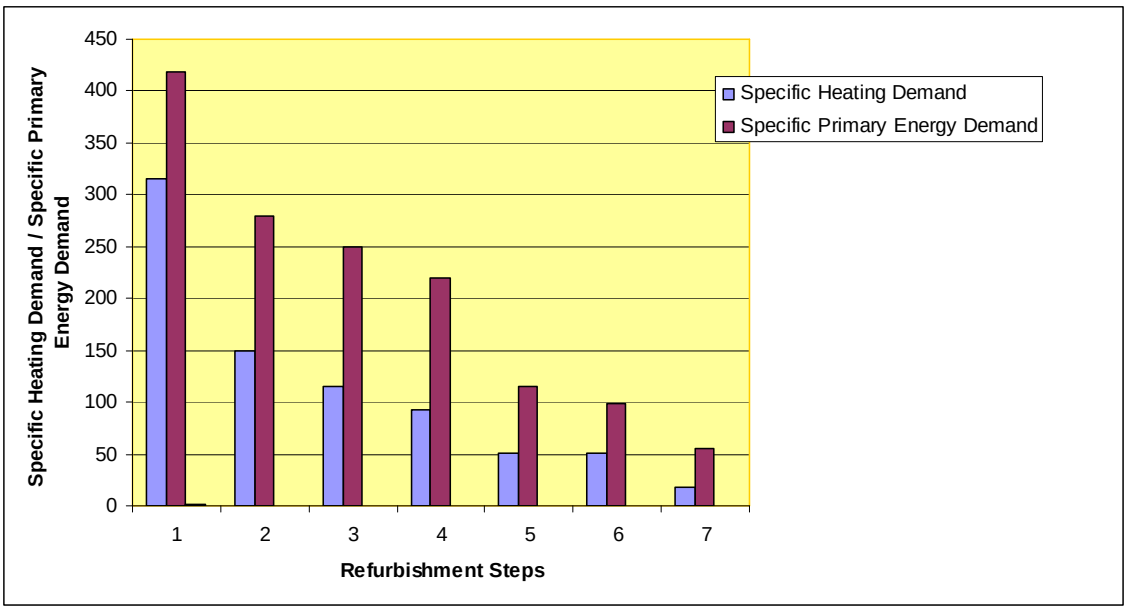
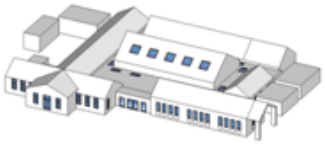


Figure 6: Overview energy efficiency improvement according to the overall refurbishment plan

3 Completion of step-by-step refurbishment to EnerPHit

3.1 PHPP Result Sheet of the completed EnerPHit standard

EnerPHit verification



Building:	Gairmscoil Na Bpiaisach-Proposal						
Street:	Rosmuc, Galway						
Postcode / City:	Galway						
Country:	Ireland						
Building type:	School						
Climate:	[IE] - Birr			Altitude of building site (in [m] above sea level):	-		
Home owner / Client:	VEC						
Street:							
Postcode/City:							
Architecture:							
Street:							
Postcode / City:							
Mechanical system:							
Street:							
Postcode / City:							
Year of construction:	2018		Interior temperature winter:	19.0	°C	Enclosed volume V, m³:	6834.6
No. of dwelling units:	1		Interior temperature summer:	25.0	°C	Mechanical cooling:	
No. of occupants:	33.8		Internal heat sources winter:	2.8	W/m²		
Spec. capacity:	132	Wh/K per m² TFA	Ditto summer:	2.8	W/m²		

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	1184.7	m²		
Space heating	Heating demand	18	kWh/(m²a)	25 kWh/(m²a)	yes
	Heating load	11	W/m²	-	-
Space cooling	Overall specif. space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	0.1	%	-	-
Primary energy	Heating, cooling, dehumidification, DHW, auxiliary electricity, lighting, electrical appliances	56	kWh/(m²a)	124 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	56	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	0.6	1/h	1 1/h	yes

* empty field: data missing; '-': no requirement

EnerPHit building retrofit (according to heating demand)? yes

Figure 7: Specific energy efficiency values of the completed project modelled with PHPP 8

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