EuroPHit

D3.4_PHPP Result Sheets

DRAFT 2

CS11 Primary school “St.St. Kiril and Methodius”

Gabrovo

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

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

Technical References

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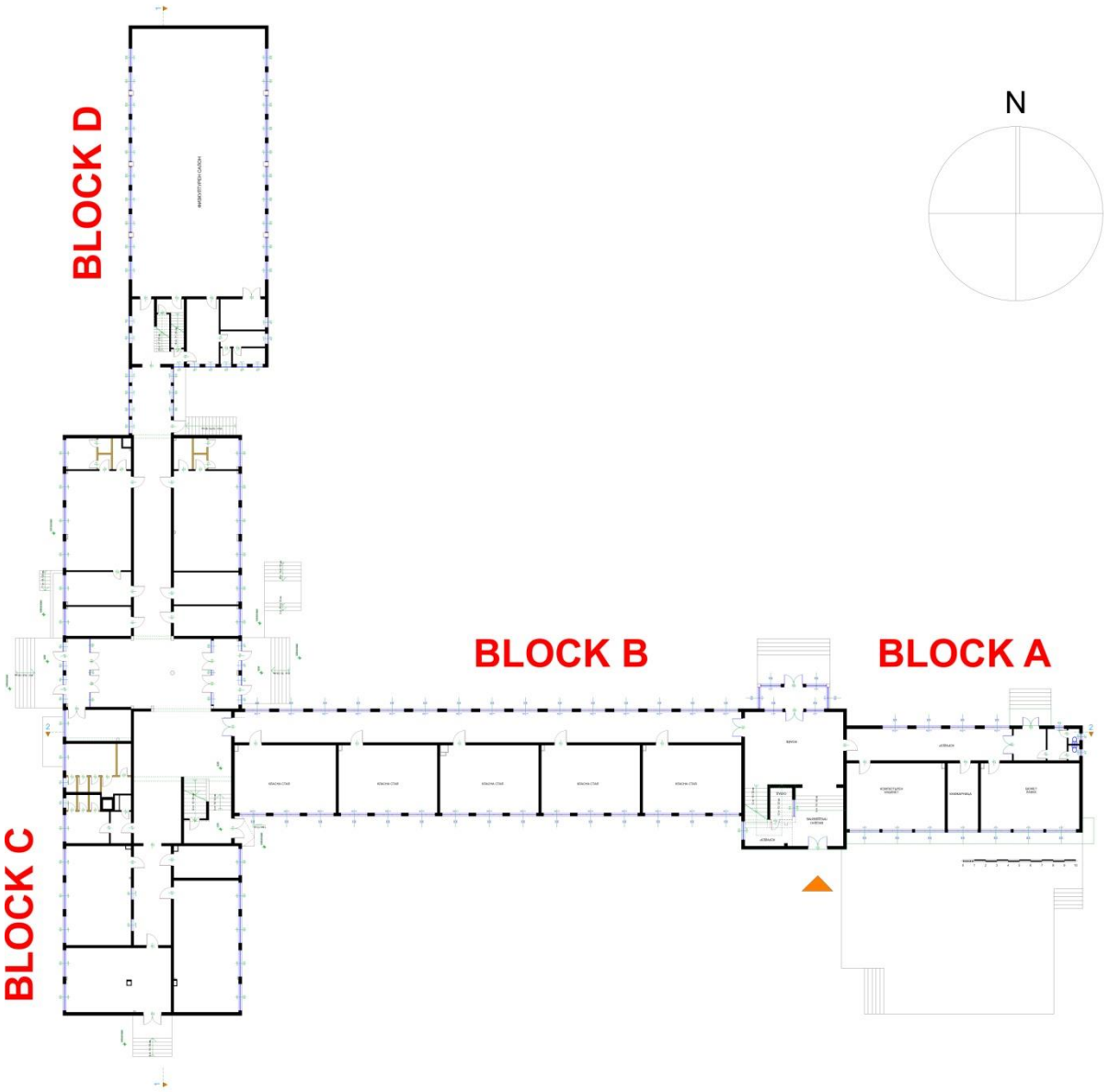
Abstract

This document provides a short overview of the efficiency improvement of a step-by-step refurbishment to EnerPHit standard to be undertaken for the project CS10.

First, the result sheet of the project´ s current status will present the calculated energy consumption of the existing building.

The PHPP result sheet of the completed EnerPHit retrofit will present the energy demand estimated for the completion of the project according to the overall refurbishment plan

Figure 1: GROUNDFLOOR PLAN, not to scale



1 Existing building: PHPP Result Sheet, Blocks A,B,C

1.1 PHPP Result sheet of the existing building

EnerPHit verification

Building:	Primary School 8 "Sveti Sveti Kiril I M
Street:	69 Mogilov blv.
Postcode/City:	Gabrovo
Country:	Bulgaria
Building type:	School
Climate:	Велико Търнов
Altitude of building site (in [m] above sea level):	426
Home owner/client:	Municipality of Gabrovo
Street:	3 Vazrazhdane square
Postcode/City:	Gabrovo

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

Year of Construction:	2014	Interior temperature winter [C°]	20,0	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:	680,0			Spec. capacity [Wh/K per m² TFA]	204
Exterior vol. V_e:	15290,3 m³			Mechanical cooling:	

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	4630,4	m²		
Space heating	Annual heating demand	142	kWh/(m²a)	25 kWh/(m²a)	no
	Heating load	66	W/m²	-	-
Space cooling	Overall specific space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	7,9	%	-	-
Primary Energy	Heating, cooling, dehumidifying, DHW, auxiliary electricity, lighting, plug	233	kWh/(m²a)	273 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	204	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	4,0	1/h	1 1/h	no

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

EnerPHit building retrofit (acc. to heating demand)? no

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

Name:	Company:	Registration number PHPP:
Surname:	Issued on:	
		Signature

Figure 2: Specific energy efficiency values of the existing building modelled with PHPP 9 Beta, Blocks A,B,C

1.2 PHPP Result sheet of the existing building, Block D

EnerPHit verification

Building:	Primary School 8 "Sveti Sveti Kiril I M		
Street:	69 Mogilov blv.		
Postcode/City:	Gabrovo		
Country:	Bulgaria		
Building type:	School		
Climate:	Велико Търнов		
Altitude of building site (in [m] above sea level):	426		
Home owner/client:	Municipality of Gabrovo		
Street:	3 Vazrazhdane square		
Postcode/City:	Gabrovo		
Architecture:		Mechanical System:	
Street:		Street:	
Postcode/City:		Postcode/City:	
Energy consulting:		Certification:	
Street:		Street:	
Postcode/City:		Postcode/City:	

Year of Construction:	2014	Interior temperature winter [C°]	18,0	Interior temp. summer [C°]	24,0
Number of dwelling units:	1	Internal heat gains winter [W/m²]	5,4	IHG summer [W/m²]	5,4
Number of Occupants:	60,0			Spec. capacity [Wh/K per m² TFA]	204
Exterior vol. V_e:	4180,4 m³			Mechanical cooling:	

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	719,4	m²		
Space heating	Annual heating demand	**228**	**kWh/(m²a)**	25 kWh/(m²a)	no
	Heating load	**123**	**W/m²**	-	-
Space cooling	Overall specific space cooling demand		**kWh/(m²a)**	-	-
	Cooling load		**W/m²**	-	-
	Frequency of overheating (> 24 °C)	11,3	%	-	-
Primary Energy	Heating, cooling, dehumidifying, DHW, auxiliary electricity, lighting, elect.		**kWh/(m²a)**	376 kWh/(m²a)	
	DHW, space heating and auxiliary electricity		kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	**4,0**	**1/h**	1 1/h	no

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

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

EnerPHit building retrofit (acc. to heating demand)?

Name:	Company:	Registration number PHPP:
Surname:	Issued on:	
		Signature

Figure 3: Specific energy efficiency values of the existing building modelled with PHPP 9 Beta, Block D

2. Retrofit steps

2.1 Overall refurbishment Plan

2.1.1 Retrofit steps:

Figure 4: Overview refurbishment steps Blocks A,B,C

step	Year	BLOCK A,B,C	Specific Heating Demand	Specific Primary Energy Demand
existing situation		Constructed in 1970, no insulation, roof in bad conditions, from 2005 -new PVC windows in blocks A,B,C and new aluminum windows in block D (the gym). Since 2013, the school is connected to the central gas heating.	142,4	233,5
STEP 1	2015	Roof insulation above the last floor slab	111	196,4
STEP 2	2015	external wall insulation, new kitchen appliances and DHW - solar panels in block B, shading blockC airtightness , ventilation, reducing thermal bridges-cutting canopies and stairs	50.5	117,0
STEP 3	2015	Insulation under the floor slab above the basement , in the technical corridor in block A, , insulation of the perimeter of the foundations block A ,Insulation of the perimeter walls of the heated basement in Block B and C	44.1	120,5
STEP 4	2025	change of PVC windows, shading blocks A,B	17,3	80.5

Figure 5: Overview refurbishment steps Block D

step	Year	BLOCK D-GYM	Specific Heating Demand	Specific Primary Energy Demand
existing situation		Constructed in 1970, no insulation, roof in bad conditions, from 2005 -new aluminum windows in block D (the gym). Since 2013, the school is connected to the central gas heating.	228,4	Overheating,no result in PHPP
STEP 1	2015	External roof insulation	153,8	322,7

STEP 2	2015	external wall insulation, airtightness , shading, ventilation, DHW - solar panels	76,0	194,3
STEP 3	2015	insulation of the perimeter walls of the heated basement, interior floor insulation above the floor slab	54,6	171,4
STEP 4	2025	change of aluminium windows	18,4	116,2

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

3 Completion of step-by-step refurbishment to EnerPHit

3.1 PHPP Result Sheet of the completed EnerPHit standard, Blocks A,B,C

EnerPHit verification

Building:	Primary School 8 "Sveti Sveti Kiril I M
Street:	69 Mogilov blv.
Postcode/City:	Gabrovo
Country:	Bulgaria
Building type:	School
Climate:	Велико Търнов
Altitude of building site (in [m] above sea level):	426
Home owner/client:	Municipality of Gabrovo
Street:	3 Vazrazhdane square
Postcode/City:	Gabrovo

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

Year of Construction:	2014	Interior temperature winter [C°]	20,0	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:	680,0			Spec. capacity [Wh/K per m² TFA]	204
Exterior vol. V_e:	15290,3 m³			Mechanical cooling:	

Specific building demands with reference to the treated floor area

Treated floor area: 4630,4 m²

				Requirements	Fulfilled?*
Space heating	Annual heating demand	**17**	**kWh/(m²a)**	25 kWh/(m²a)	yes
	Heating load	**13**	**W/m²**	-	-
Space cooling	Overall specific space cooling demand		**kWh/(m²a)**	-	-
	Cooling load		**W/m²**	-	-
	Frequency of overheating (> 25 °C)	3,1	%	-	-
Primary Energy	Heating, cooling, dehumidifying, DHW, auxiliary electricity, lighting, elect.	**90**	**kWh/(m²a)**	123 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	63	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	**1,0**	**1/h**	1 1/h	yes

* empty field: data missing; -: no requirement

EnerPHit building retrofit (acc. to heating demand)? yes

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

Name:	Company:	Registration number PHPP:
Surname:	Issued on:	
		Signature

Figure 6: Specific energy efficiency values of the completed project modelled with PHPP 9 Beta, Blocks A,B,C

3.2 PHPP Result Sheet of the completed EnerPHit standard, Block D

EnerPHit verification

Building:	Primary School 8 "Sveti Sveti Kiril I M
Street:	69 Mogilov blv.
Postcode/City:	Gabrovo
Country:	Bulgaria
Building type:	School
Climate:	Велико Търнов
Altitude of building site (in [m] above sea level):	426
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Architecture:		Mechanical System:	
Street:		Street:	
Postcode/City:		Postcode/City:	
Energy consulting:		Certification:	
Street:		Street:	
Postcode/City:		Postcode/City:	

Year of Construction:	2014	Interior temperature winter [C°]	18,0	Interior temp. summer [C°]	24,0
Number of dwelling units:	1	Internal heat gains winter [W/m²]	5,4	IHG summer [W/m²]	5,4
Number of Occupants:	60,0			Spec. capacity [Wh/K per m² TFA]	204
Exterior vol. V_e:	4180,4 m³			Mechanical cooling:	

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	719,4	m²		
Space heating	Annual heating demand	**18**	**kWh/(m²a)**	25 kWh/(m²a)	yes
	Heating load	**22**	**W/m²**	-	-
Space cooling	Overall specific space cooling demand		**kWh/(m²a)**	-	-
	Cooling load		**W/m²**	-	-
	Frequency of overheating (> 24 °C)	7,3	%	-	-
Primary Energy	Heating, cooling, dehumidifying, DHW, auxiliary electricity, lighting, elect.	**116**	**kWh/(m²a)**	124 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	88	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	**1,0**	**1/h**	1 1/h	yes

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

EnerPHit building retrofit (acc. to heating demand)? yes

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

Name:	Company:	Registration number PHPP:
Surname:	Issued on:	
		Signature

Figure 7: Specific energy efficiency values of the completed project modelled with PHPP 9 Beta, Block D