Passive House - Project Documentation

General Building Information

Passive House Database ID	5223
Building Type	Single detached family house
Location	GR - 19014 Ippokratios Politeia (Attica)

Certified
Passive House
Passive House Institute
| classic | plus | premium

Responsible Project Participants

Architect	Ciaran O'Leary
Mechanical Engineer	Fotis Chrisoulas
Building Physics	Dimitris Pallantzas/Aggeliki Stathopoulou
Building Services	Stefan Pallantzas
Statics	Fotios Chrissoulas
Craftsperson	Konstantin Spanos
Certifier	Stefan Pallantzas

Declaration of the Constriction Supervisor

Project name:	Detached family house in Ippokratios Polithia.
Site address:	Elpinoros 3, Ippokratios Polithia.

Declaration of the Construction Supervisor

Herewith I confirm that the following Passive House project has been executed according to the architectural drawings and specification documents, which had been submitted to the Certifier Stefan Pallantzas and the Passive House Institute for the certification.

Site Supervisor, Company	Project manager, Company
Place, Date 31/05/2017	Place, Date 31/05/2017
Sign, Stamp NET ZERO Α.ΑΘΑΝΑΣΟΠΟΥΛΟΣ- Α.ΣΤΑΘΟΠΟΥΛΟΥ Ο.Ε. ΥΠΗΡΕΣΙΕΣ ΜΗΧΑΝΙΚΩΝ ΣΤΕΓΗΣ 18, Τ.Κ.15344 ΓΕΡΑΚΑΣ ΑΤΤΙΚΗΣ ΤΗΛ: 2108226822 ΑΦΜ: 800831910 - ΔΟΥ: ΠΑΛΛΗΝΗΣ	Sign, Stamp NET ZERO Α.ΑΘΑΝΑΣΟΠΟΥΛΟΣ- Α.ΣΤΑΘΟΠΟΥΛΟΥ Ο.Ε. ΥΠΗΡΕΣΙΕΣ ΜΗΧΑΝΙΚΩΝ ΣΤΕΓΗΣ 18, Τ.Κ.15344 ΓΕΡΑΚΑΣ ΑΤΤΙΚΗΣ ΤΗΛ: 2108226822 ΑΦΜ: 800831910 - ΔΟΥ: ΠΑΛΛΗΝΗΣ

Picture 1

Brief Description

The projects concerns the construction of a detached house, with a TFA = 231 m^2, which was designed to reduce the requirement for a conventional heating or air conditioning system. The property is located in Ippokrateios Politeia, in the Prefecture of Attica, on an altitude of 550 m. It consists of 2 floors and a basement accessible by internal stairs. The building is northwest oriented within the plot, with main openings to south and west. The construction was completed in 2017 and it is certified as Passive House Plus.

The main functions of the building are developed on the ground floor and basement area. The ground floor which includes the living room, the kitchen, the office, and the bathroom. On the first floor includes three bedrooms and 2 bathrooms. Meanwhile, the basement includes a living room, a bedroom, a WC, the laundry, and the engine room.

The projected building is characterized with a typological and constructive design that allows to minimize the energy consumption of the house. We made use of natural materials, healthy and with low environmental impact, to promote a healthy and comfortable interior. The orientation of the building was determined to exploit wind and sunlight to the maximum extent.

Data of building

Annual Heating Demand	7 kWh / (m^2a)
Heating Load	12 W/m^2
Cooling Demand	8 kWh/(m^2a)
Cooling Load	10 W/m^2
Primary Energy Renewable (PER)	29 kWh / (m^2a)
Generation of renewable energy	10 kWh / (m^2a)
Non renewable Primary Energy (PE)	51 kWh / (m^2a)
Pressure Test n_{50}	0.6 / h

Structural Component	U - Value (W/(m^2k))

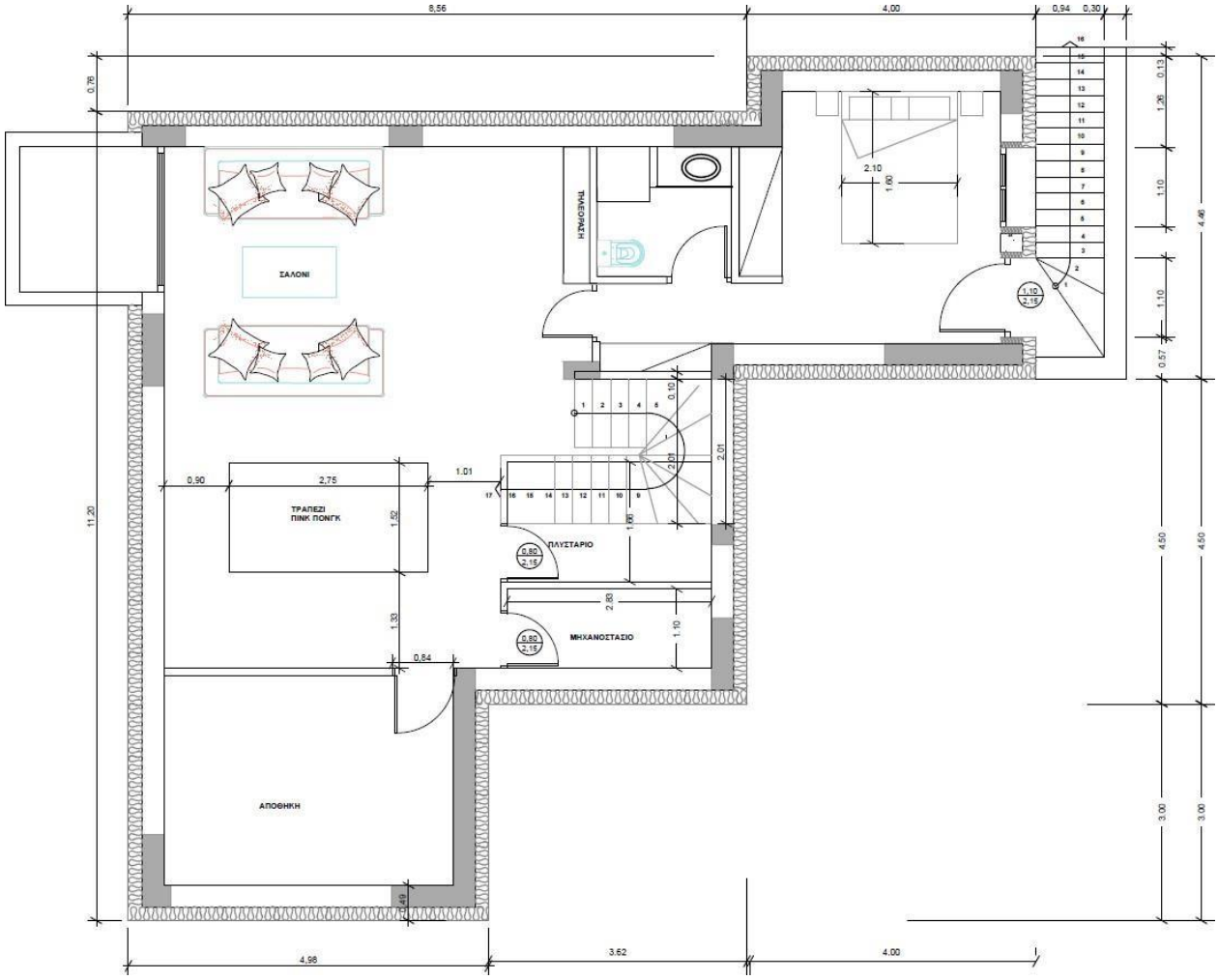
Exterior Wall	0.143
Interior	
Basement Floor / Floor Slab	0.476
Roof	0.187
Frame	0.91
Glazing	0.64 g value = 50 %
Entrance Door	1

Views of the Building

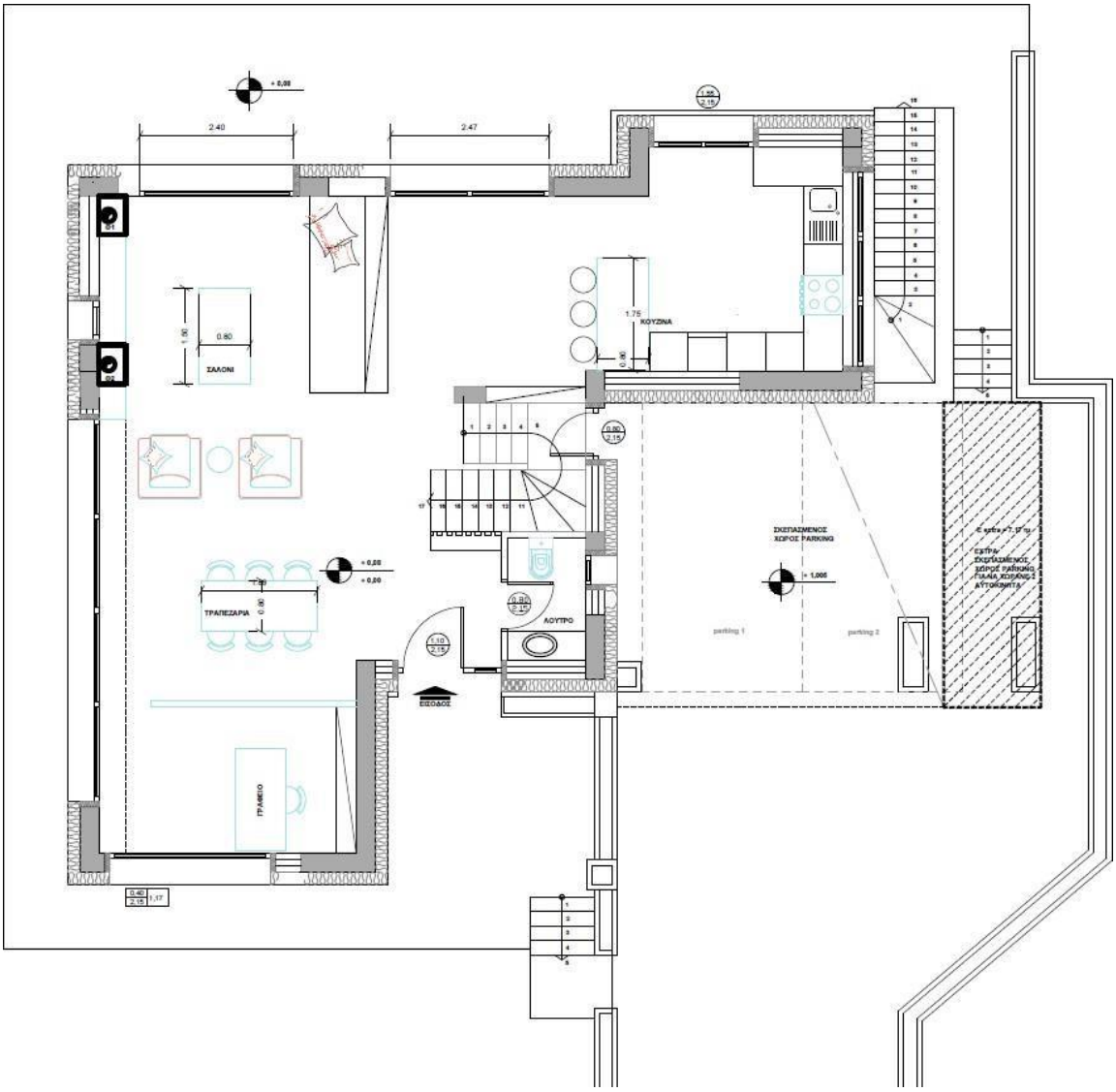
Picture 2: Southwest view of the house

Picture 3: Northwest view of the house

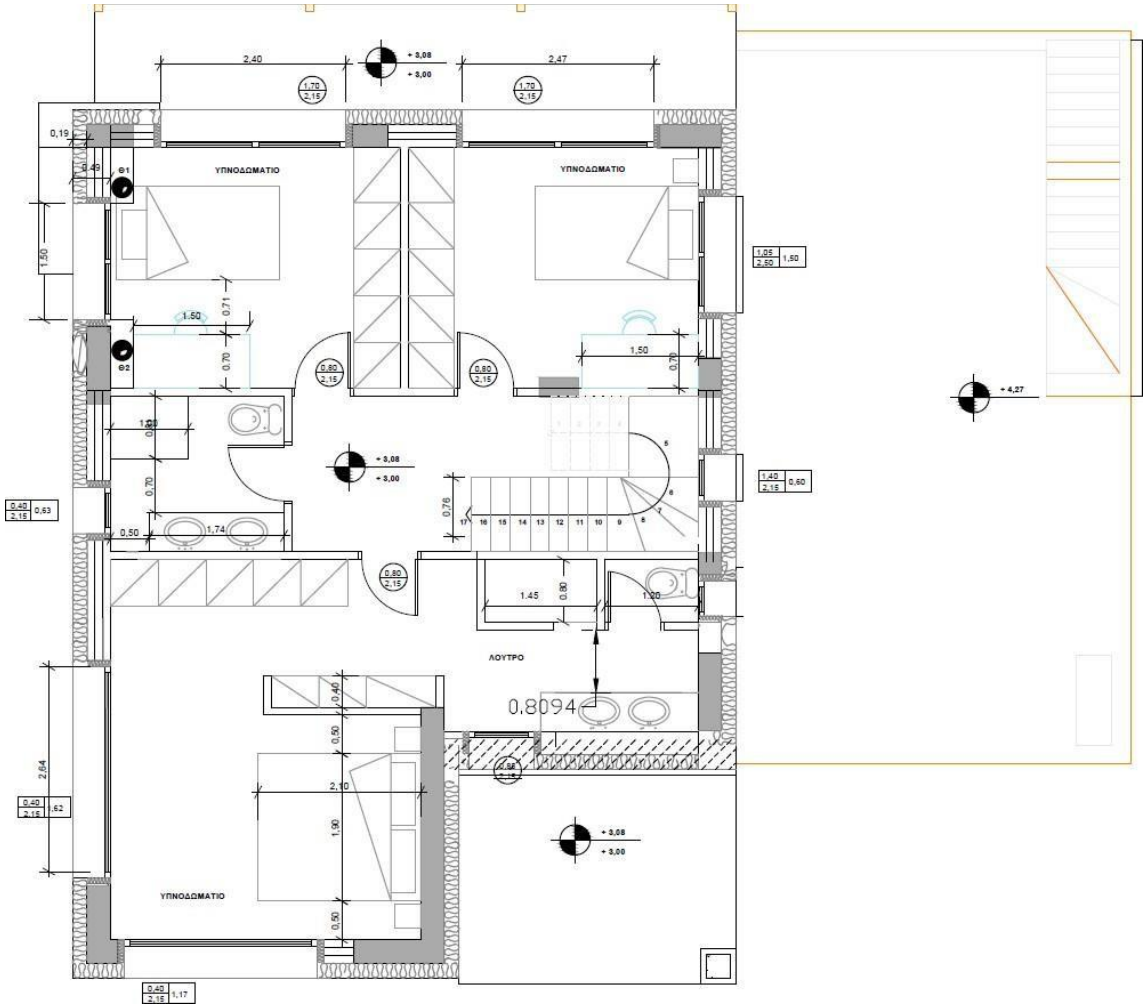
Floor Plans



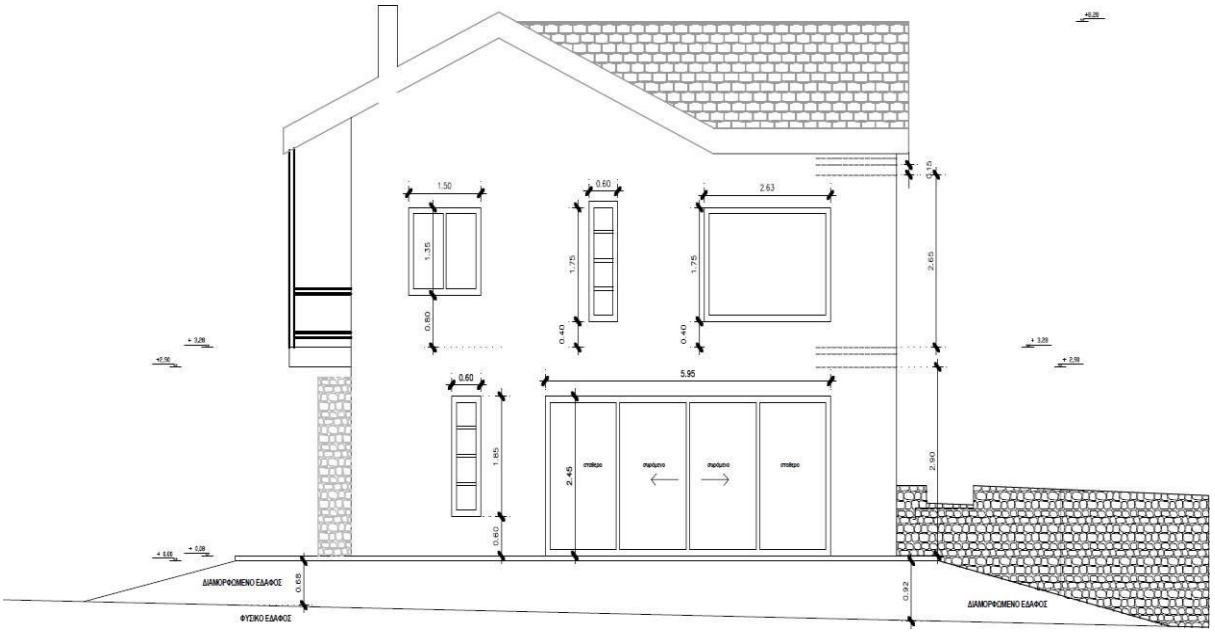
Picture 4: Basement plan



Picture 5: Ground Floor plan



Picture 6: First Floor plan



Picture 7: South Elevation

Picture 8: West Elevation

Picture 9: East Elevation

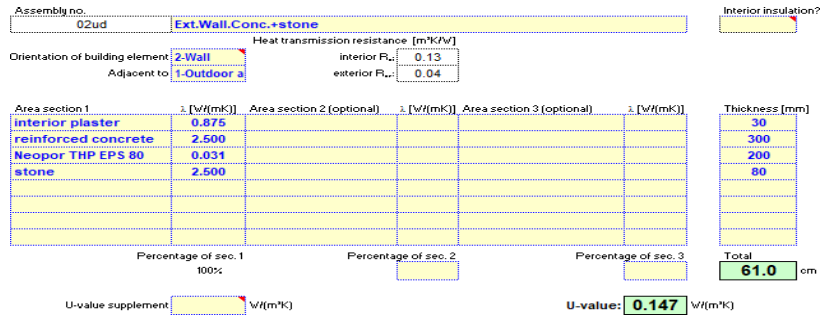
Construction Details of the Envelope

- Exterior Walls
  U - Value = 0.143 W/(m²K)

The building is constructed with a variety of structural elements. There are 5 different masonry in total. They are being constructed with reinforced frames (slabs, columns and beams), brick and stones. The building is thermally insulated with external insulation with Neopor THP EPS 80 with a U-Value of λ=0,031 W / mK. In the following pictures are displayed the different wall structures of the construction:

Assembly no.	Building assembly description					Interior insulation?
01ud	Ext.Wall.Conc.					
	Heat transmission resistance [m²K/W]					
Orientation of building element	2-Wall	interior R_{si}	0.13			
Adjacent to	1-Outdoor a	exterior R_{se}	0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
interior plaster	0.870					30
reinforced concrete	2.500					300
Neopor THP EPS 80	0.031					200
acrylic plaster	0.487					4
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						53.4 cm
U-value supplement	W/(m²K)			U-value:	0.147 W/(m²K)	

Picture 10: PHPP U-Values input



Assembly no.						Interior insulation?
02ud	Ext.Wall.Conc.+stone					

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0.13

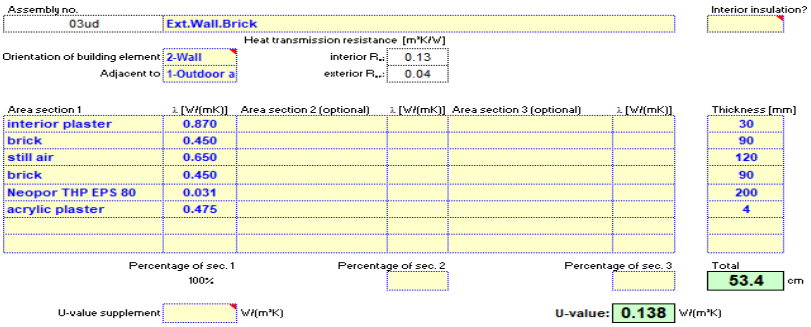
Adjacent to: 1-Outdoor a — exterior R_{se}: 0.04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
interior plaster	0.875					30
reinforced concrete	2.500					300
Neopor THP EPS 80	0.031					200
stone	2.500					80

Percentage of sec. 1: 100% — Percentage of sec. 2 — Percentage of sec. 3 — Total: 61.0 cm

U-value supplement — W/(m²K) — **U-value: 0.147** W/(m²K)

Picture 11: PHPP U-Values input



Assembly no.			Interior insulation?
03ud	Ext.Wall.Brick		

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0.13

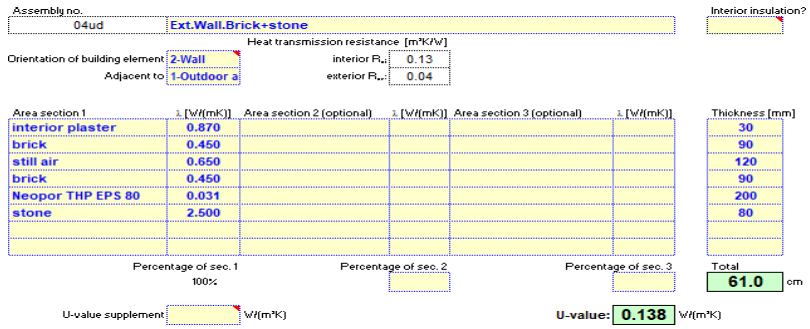
Adjacent to: 1-Outdoor a — exterior R_{se}: 0.04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
interior plaster	0.870					30
brick	0.450					90
still air	0.650					120
brick	0.450					90
Neopor THP EPS 80	0.031					200
acrylic plaster	0.475					4

Percentage of sec. 1: 100% — Percentage of sec. 2 — Percentage of sec. 3 — Total: 53.4 cm

U-value supplement — W/(m²K) — **U-value: 0.138** W/(m²K)

Picture 12: PHPP U-Values input



Assembly no.			Interior insulation?
04ud	Ext.Wall.Brick+stone		

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0.13

Adjacent to: 1-Outdoor a — exterior R_{se}: 0.04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
interior plaster	0.870					30
brick	0.450					90
still air	0.650					120
brick	0.450					90
Neopor THP EPS 80	0.031					200
stone	2.500					80

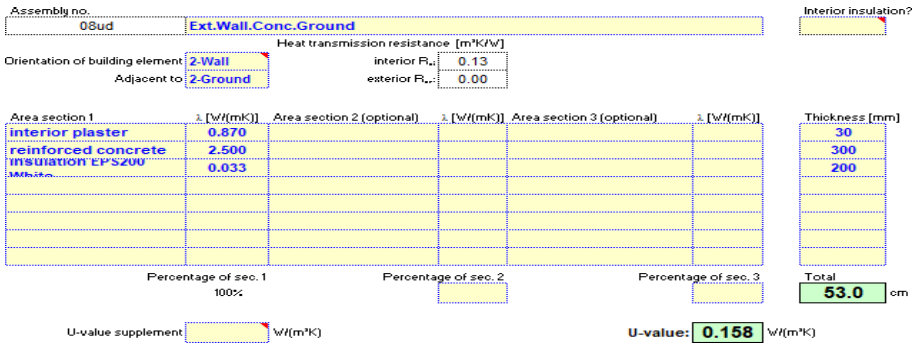
Percentage of sec. 1: 100% — Percentage of sec. 2 — Percentage of sec. 3 — Total: 61.0 cm

U-value supplement — W/(m²K) — **U-value: 0.138** W/(m²K)

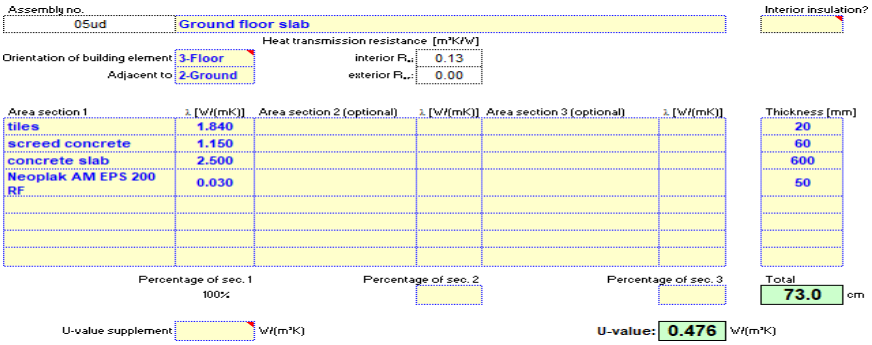
Picture 13: PHPP U-Values input

- Basement exterior wall and floor slab
  $U_{bas.ext.wall}$ - Value = 0.158 W/(m²K)
  $U_{floor\ slab}$ - Value = 0.476 W/(m²K)

The insulation of the basement walls and the basement floor slab has been placed externally, with EPS200 that had a thickness of 20 cm in the walls and 5 cm below the slab. The interruption between floor and slab insulation has been taken into account as thermal bridge in PHPP.



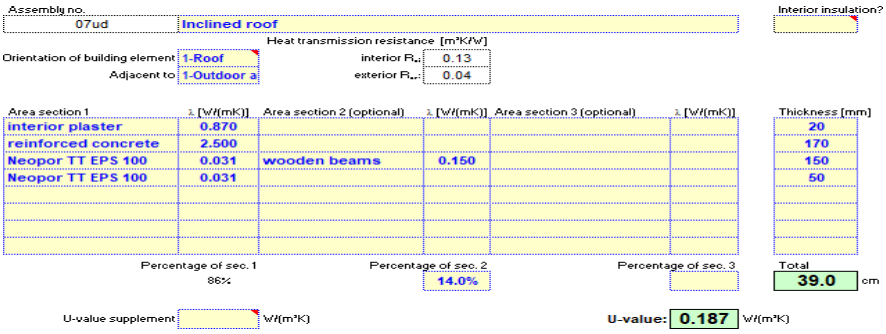
Picture 14: PHPP U-Values input



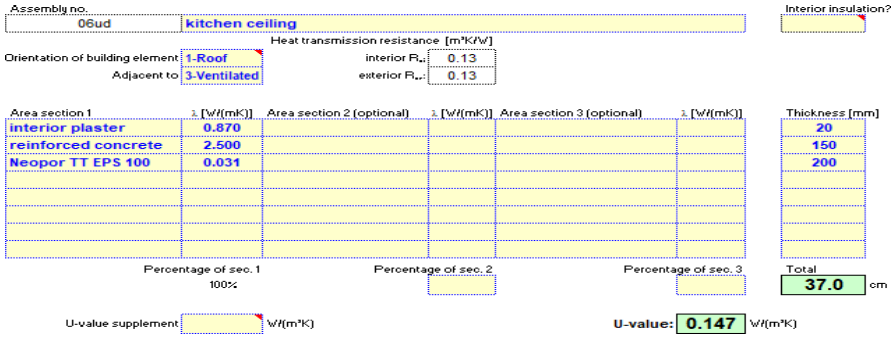
Picture 15: PHPP U-Values input

- Roof & Ceiling
  U - Value = 0.187 W/(m^{2}K)

The roof of the kitchen is horizontal, while the roof of the rest house is inclined and consists of three indepented parts. Each part consists of the concrete ceiling slab, the insulation layer and a wooden roof construction with concrete roof tiles. The insulation layer is NEOPOR TT EPS 100 with a U – Value of λ=0,031 W / mK, and is uninterrupted with the external walls' insulation, with thermal bridge free design.



Picture 16: PHPP U-Values input



Picture 17: PHPP U-Values input

Windows installation details

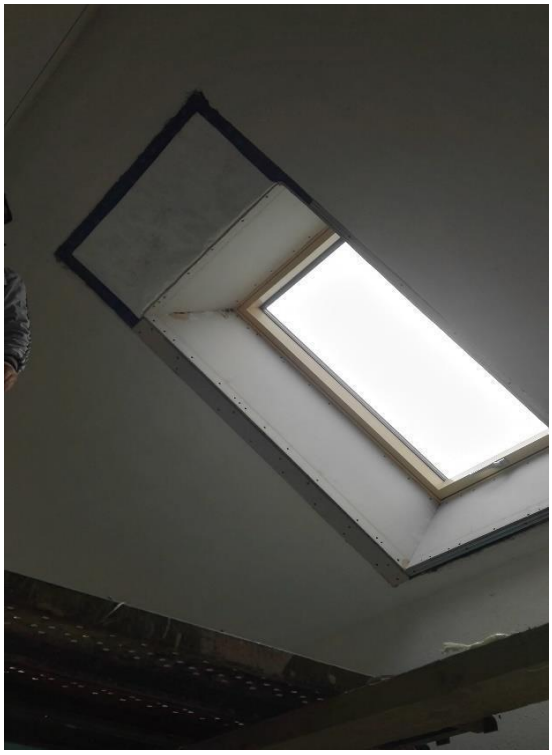
The placement of the windows was designed to minimize thermal bridges to achieve the Passive House Standard. Windows were hung on the external side of the brick walls, inside the insulation layer.

Frame
Profine Gmbh, Koemmerling 88Plus PVC Windows ans Sliding Doors Two certified FAKRO skylights Uw-value = 0.91 W/(m^{2}K)

Glazing
Saint-Gobain Glass Germany - SGG CLIMATOP LUX II (4:/18/4/18/:4 Ar 90%) Ug-value = 0.64 W/(m2K) g -value = 50 %

Picture 18: Window installation

Picture 19 : Window installation



Picture 20: Window installation

- Thermal Bridges

All existing thermal bridges have been calculated and designed to have the least impact on heating or cooling demand of the building and the ψ -values are entered in PHPP.

- Airtightness Test

BUILDING LEAKAGE TEST

HELLENIC PASSIVE HOUSE INSTITUTE

Date of Test: 25/09/2017
Test File: IPPOKRATIOS DIONYSIOTIS 1new

Technician: Aggeliki Stathopoulou
Project Number: 001

Customer: Theofanis Dionysiotis
Elpinoros 1
Ippokratios Politia, Attiki
Phone:
Fax:
Email: fanisdionysiotis@yahoo.gr

Building Address: Single Family House
Elpinoros 1
Ippokratios Politia, Attiki

	Depressurization	Pressurization	Average
Test Results at 50 Pascals:			
V50: m³/h Airflow	570 (+/- 2.8 %)	493 (+/- 1.9 %)	531
n50: 1/h (Air Change Rate)	0.68	0.59	0.63
w50: m³/(h·m² Floor Area)	2.19	1.90	2.04
q50: m³/(h·m² Envelope Area)	0.81	0.70	0.76
Leakage Areas:			
Canadian EqLA @ 10 Pa (cm²)	197.1 (+/- 5.2 %)	203.2 (+/- 4.0 %)	200.1
cm²/m² Surface Area	0.28	0.29	0.29
LBL ELA @ 4 Pa (cm²)	97.7 (+/- 8.7 %)	111.4 (+/- 6.5 %)	104.5
cm²/m² Surface Area	0.14	0.16	0.15
Building Leakage Curve:			
Air Flow Coefficient (Cenv) m³/(h·Pa^n)	33.7 (+/- 14.1 %)	45.1 (+/- 10.5 %)	
Air Leakage Coefficient (CL) m³/(h·Pa^n)	33.0 (+/- 14.1 %)	43.8 (+/- 10.5 %)	
Exponent (n)	0.728 (+/- 0.040)	0.619 (+/- 0.029)	
Correlation Coefficient	0.99776	0.99831	

Test Standard: EN 13829
Test Mode: Depressurization and Pressurization
Type of Test Method: A
Regulation complied with: Passive House Criteria n50 ≤ 0.6 1/h

Picture 21: Ducts

Picture 22: Windows installation

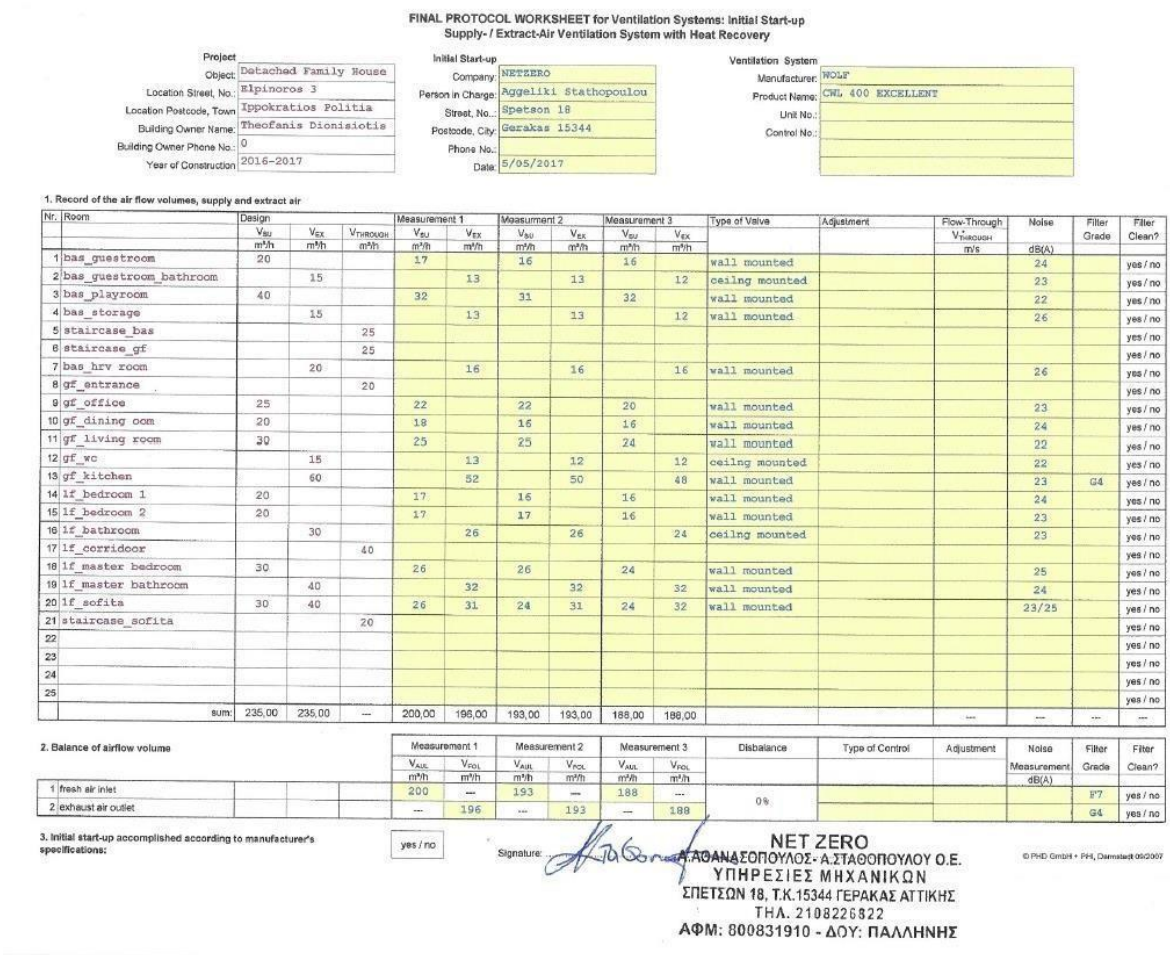
Picture 23: Airtightness tape

HVAC Systems

System	Description
Ventilation	Wolf, CWL 400 Typical Ventilation System with HeatRecovery. Eff. specif. HRE: 82%
Heating Installation	Underfloor Heating/Cooling with a 9KW Air-to_water Heat Pump
Domestic Hot Water	6m^2 Solar/Vacuum Tubes Storage inside the thermal envelope Direct Electricity Support
Ecological Aspects	26m² photovoltaic panels
Construction Cost	1000 €/m^2 Treated Floor Area according to PHPP (Costs of group 200-700)

- Ventilation

To reduce heat losses through ventilation, a dual-flow mechanical ventilation system with high efficiency air-to-air heat exchanger unit was installed. The unit is WOLF CWL-400, with effective heat recovery rate 82%.



FINAL PROTOCOL WORKSHEET for Ventilation Systems: Initial Start-up
Supply- / Extract-Air Ventilation System with Heat Recovery

Project
Object: Datached Family House
Location Street, No.: Elpinoros 3
Location Postcode, Town: Ippokratios Politia
Building Owner Name: Theofanis Dionisiotis
Building Owner Phone No.: 0
Year of Construction: 2016-2017

Initial Start-up
Company: NETZERO
Person in Charge: Aggeliki Stathopoulou
Street, No...: Spetson 18
Postcode, City: Gerakas 15344
Phone No.:
Date: 5/05/2017

Ventilation System
Manufacturer: WOLF
Product Name: CWL 400 EXCELLENT
Unit No.:
Control No.:

1. Record of the air flow volumes, supply and extract air

Nr.	Room	Design V_{SU} m³/h	Design V_{EX} m³/h	Design $V_{THROUGH}$ m³/h	Measurement 1 V_{SU} m³/h	Measurement 1 V_{EX} m³/h	Measurement 2 V_{SU} m³/h	Measurement 2 V_{EX} m³/h	Measurement 3 V_{SU} m³/h	Measurement 3 V_{EX} m³/h	Type of Valve	Adjustment	Flow-Through $V_{THROUGH}$ m³/s	Noise dB(A)	Filter Grade	Filter Clean?
1	bas_guestroom	20			17		16		16		wall mounted			24		yes / no
2	bas_guestroom_bathroom		15			13		13		12	ceilng mounted			23		yes / no
3	bas_playroom	40			32		31		32		wall mounted			22		yes / no
4	bas_storage		15			13		13		12	wall mounted			26		yes / no
5	staircase_bas			25												yes / no
6	staircase_gf			25												yes / no
7	bas_hrv room		20			16		16		16	wall mounted			26		yes / no
8	gf_entrance			20												yes / no
9	gf_office	25			22		22		20		wall mounted			23		yes / no
10	gf_dining oom	20			18		16		16		wall mounted			24		yes / no
11	gf_living room	30			25		25		24		wall mounted			22		yes / no
12	gf_wc		15			13		12		12	ceilng mounted			22		yes / no
13	gf_kitchen		60			52		50		48	wall mounted			23	G4	yes / no
14	1f_bedroom 1	20			17		16		16		wall mounted			24		yes / no
15	1f_bedroom 2	20			17		17		16		wall mounted			23		yes / no
16	1f_bathroom		30			26		26		24	ceilng mounted			23		yes / no
17	1f_corridoor			40												yes / no
18	1f_master bedroom	30			26		26		24		wall mounted			25		yes / no
19	1f_master bathroom		40			32		32		32	wall mounted			24		yes / no
20	1f_sofita	30	40		26	31	24	31	24	32	wall mounted			23/25		yes / no
21	staircase_sofita			20												yes / no
22																yes / no
23																yes / no
24																yes / no
25																yes / no
	sum:	235,00	235,00	---	200,00	196,00	193,00	193,00	188,00	188,00			---	---	---	---

2. Balance of airflow volume

	Measurement 1 V_{AUL} m³/h	Measurement 1 V_{FOL} m³/h	Measurement 2 V_{AUL} m³/h	Measurement 2 V_{FOL} m³/h	Measurement 3 V_{AUL} m³/h	Measurement 3 V_{FOL} m³/h	Disbalance	Type of Control	Adjustment	Noise Measurement dB(A)	Filter Grade	Filter Clean?
1 fresh air inlet	200	---	193	---	188	---	0%				F7	yes / no
2 exhaust air outlet	---	196	---	193	---	188					G4	yes / no

3. Initial start-up accomplished according to manufacturer's specifications: yes / no

Signature:

NET ZERO
Α.ΑΘΑΝΑΣΟΠΟΥΛΟΣ- Α.ΣΤΑΘΟΠΟΥΛΟΥ Ο.Ε.
ΥΠΗΡΕΣΙΕΣ ΜΗΧΑΝΙΚΩΝ
ΣΠΕΤΣΩΝ 18, Τ.Κ.15344 ΓΕΡΑΚΑΣ ΑΤΤΙΚΗΣ
ΤΗΛ. 2108226822
ΑΦΜ: 800831910 - ΔΟΥ: ΠΑΛΛΗΝΗΣ

Picture 24: Ventilation Measurements

- Heat Supply- Domestic How Water – PV

The heating and cooling demand is covered by a underground air to water split heat pump of 2 kW. The hot water is heated by a solar water heater,which is installed inside the building envelope and its 6 m^2 panels on the roof. The installation of 26 m^2 photovoltaic panels will cover all the needs of energy consumption of the building.

Project Results

Building Characteristics	Values
Airtightness	0.6 / h
Annual heating demand	7 kWh / (m^2a)
Heating load	12 W/m^2
PE demand (non-renewable Primary Energy)	51 kWh / (m^2a)
PER demand (renewable Primary Energy)	29 kWh / (m^2a)
Generation of renewable energy	10 kWh / (m^2a)
Cooling load	8 W/m^2
Cooling and dehumidification demand	10 kWh / (m^2a)

PHHP Results

All the building data have been imported to the PHPP v9 planning program, verifying that the Passive House Classic certification criteria are met.

Passive House Verification

Photo or Drawing

Building:	Detached Family House				
Street:	Elpinoros 3				
Postcode/City:	19014	Ippokratios Politia			
Province/Country:	Attiki	GR-Greece			
Building type:	Residential				
Climate data set:	ud-- 02-GR0003a-Ippokratios Politia				
Climate zone:	4: Warm-temperate	Altitude of location:	554 m		
Home owner / Client:	Theofanis Dionisiotis				
Street:	Elpinoros 3				
Postcode/City:	19014	Ippokratios Politia			
Province/Country:	Attiki	GR-Greece			

Architecture:	Chiaran O'Leary - Maria-Georgia Prassopoulou		**Mechanical engineer:**	Fotis Chrisoulas	
Street:	Vrioulon 42		Street:	St.Grammatikogianni str.	
Postcode/City:	15121	Pefki	Postcode/City:	19014	Kapandriti
Province/Country:	Attica	GR-Greece	Province/Country:	Attica	GR-Greece
Energy consultancy:	Dimitris Pallantzas / Aggeliki Stathopoulou		**Certification:**	Hellenic Passive House Institute	
Street:			Street:	Anastaseos 112	
Postcode/City:			Postcode/City:	15669	Papagou
Province/Country:			Province/Country:	Attiki	GR-Greece

Year of construction:	2016-2017	Interior temperature winter [°C]:	20,0	Interior temp. summer [°C]:	
No. of dwelling units:	1	Internal heat gains (IHG) heating case [W/m²]:	2,3	IHG cooling case [W/m²]:	25,0
No. of occupants:	3,1	Specific capacity [Wh/K per m² TFA]:	204	Mechanical cooling:	2,3
Specific building characteristics with reference to the treated floor area					x

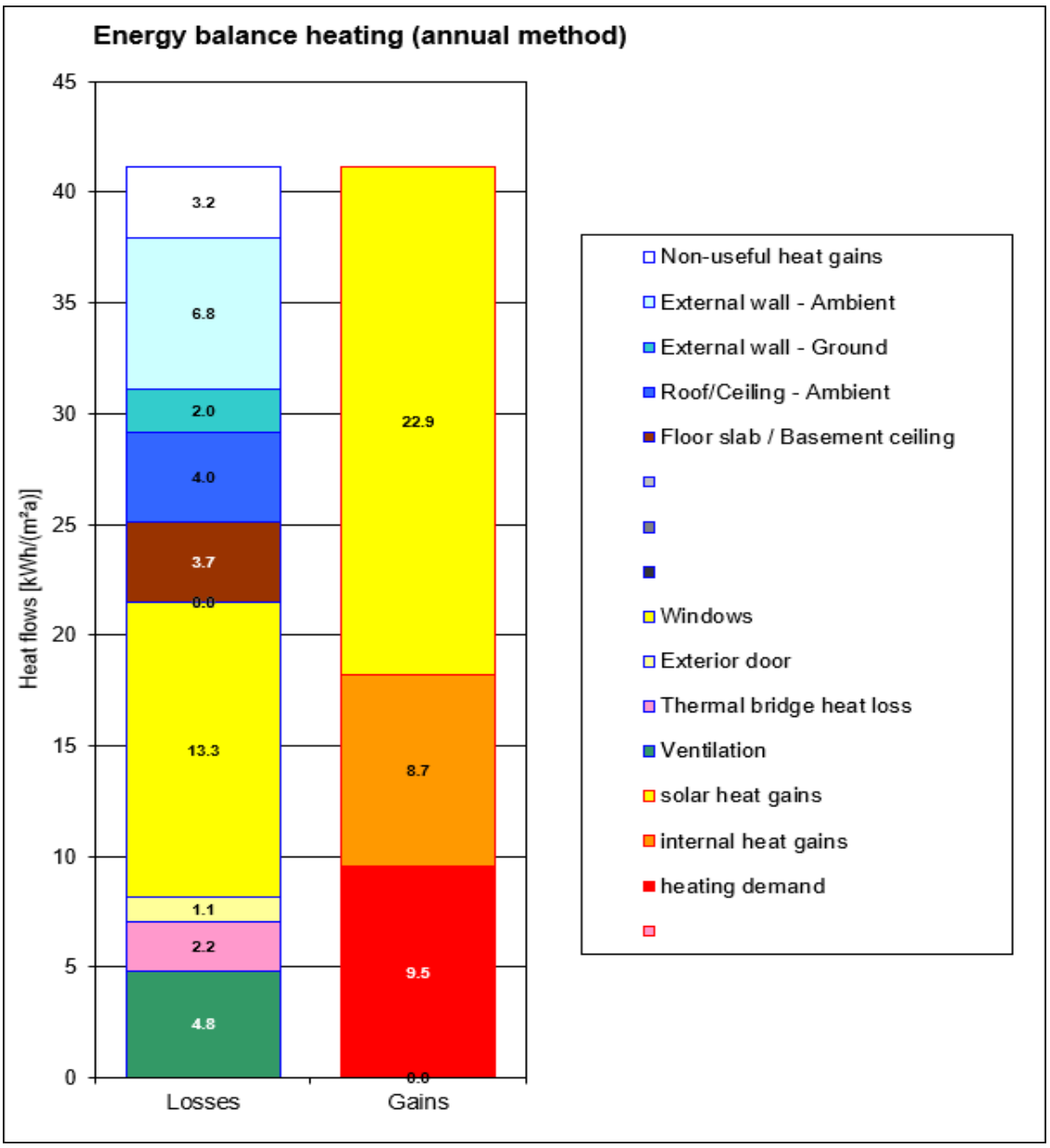
				Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area m²	231.4				
Space heating	Heating demand kWh/(m²a)	7	≤	15	-	yes
	Heating load W/m²	12	≤	-	10	
Space cooling	Cooling & dehum. demand kWh/(m²a)	8	≤	15	15	yes
	Cooling load W/m²	10	≤	-	10	
	Frequency of overheating (> 25 °C) %	-	≤	-		-
	Frequency of excessively high humidity (> 12 g/kg) %	0	≤	10		yes
Airtightness	Pressurization test result n_{50} 1/h	0.6	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	51	≤	-		-
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	29	≤	60	60	yes
	Generation of renewable energy (in relation to projected building footprint area) kWh/(m²a)	10	≥	-	-	

[2] Empty field: Data missing; '-': No requirement

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.

Passive House Classic? yes

Picture 25: Verification worksheet of the PHPP v9.



Picture 26: The heating demand balance of the single-family house, calculated by the PHPP.

References

Passivistas.com the house project: http://passivistas.com/

https://passivehouse-database.org/index.php?lang=en#d_5223