Zero Build Forum’20

International Virtual Forum on Zero Energy Buildings

Passive House Day

FROM ZERO TO HERO

Speaker’s Name: Panagiotis (Panos) Papassotiriou & Pavlos Michos

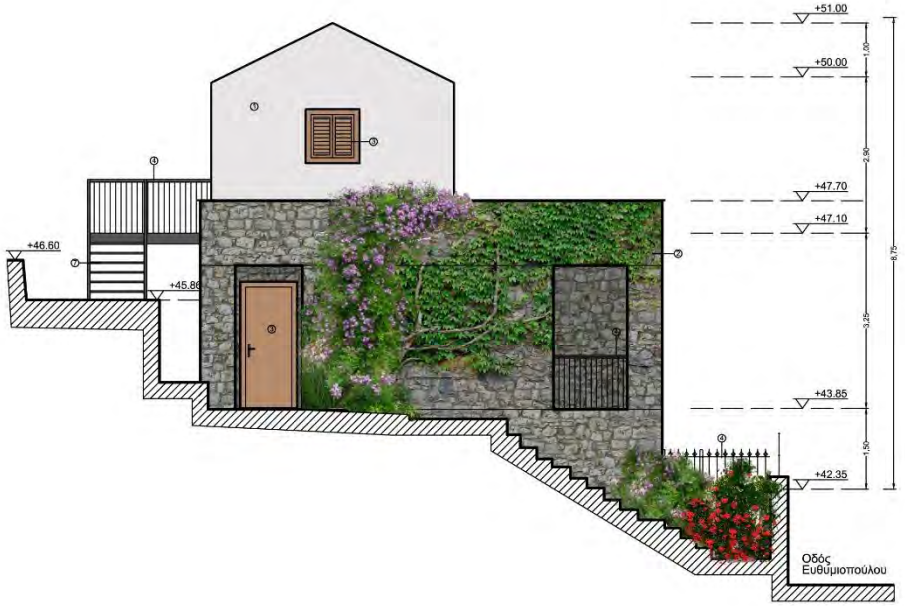
Speaker’s Position & Institution:
Panos P. - Studio 2Pi Architects - Managing Director – Architect
Pavlos M. - 02 Architecture & Mech. Engineering - Managing Director – Mechanical Engineer

SIFIR ENERJİ ve PASİF EV DERNEĞİ
ZERO ENERGY and PASSIVE HOUSE ASSOCIATION

Passive House in the old town of Nafplio Peloponnese – Greece

- **Pavlos Michos** -
Mechanical Engineer, MSc, MASHRAE, CPHD –
02 Architecture and Mechanical Engineering (https://www.0-2gr/)

- **Panagiotis (Panos) Papassotiriou** -
Architect, Ba(hons) Dip. Arch. ARB –
Studio 2Pi Architecture (https://s2pia.com/)



THE TEAM

- **Stefan Pallantzas**

Msc Civil Engineer, President of Hellenic Passive House Institute

- **Pavlos Michos** -

Mechanical Engineer, MSc, MASHRAE, CPHD

- **Aggeliki Stathopoulou** -

Civil Engineer, Certified Passive House Designer

- **Giorgos Taraviras** -

Civil Engineer, AUTh

- **Panagiotis (Panos) Papassotiriou** -

Architect, Ba(hons) Dip. Arch. ARB

BEFORE

Presentation Title: **FROM ZERO TO HERO**
Speaker's Name & Institution: **Panos P. - Studio 2Pi Architects - Managing Director - Architect**

LOCATION

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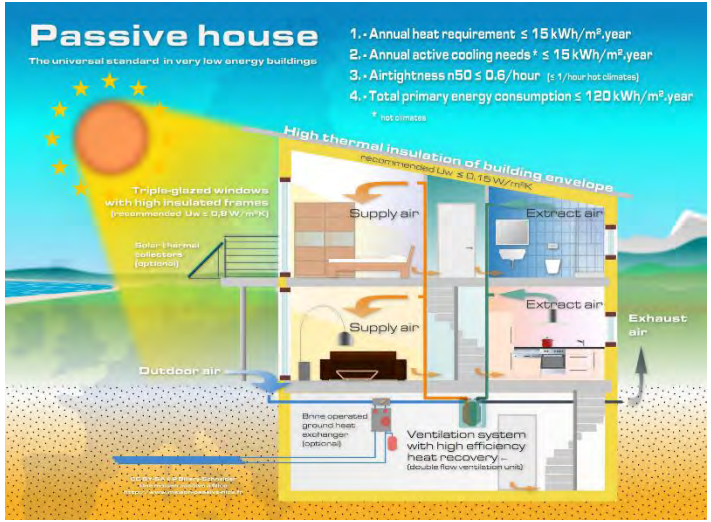
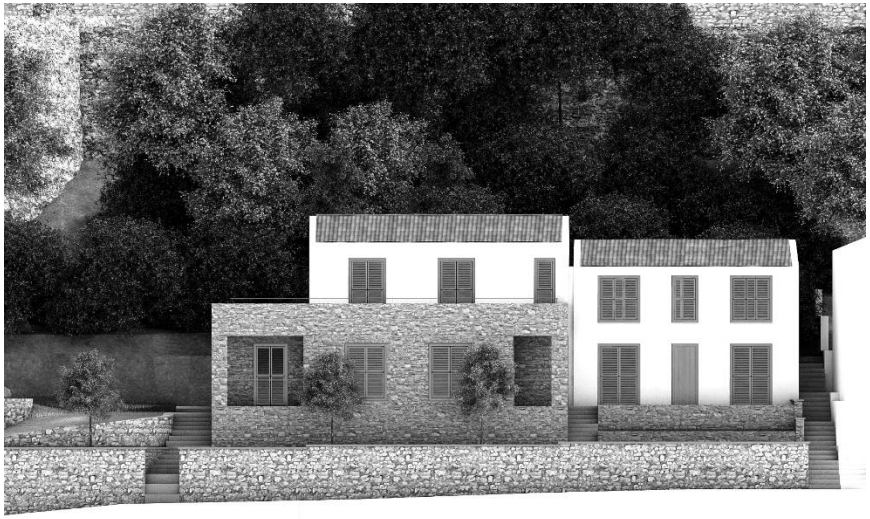
MATERIALS

PARADIGMS

FORM & FUNCTION





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FORM & FUNCTION

END PRODUCT (Almost there)

ALONG THE WAY

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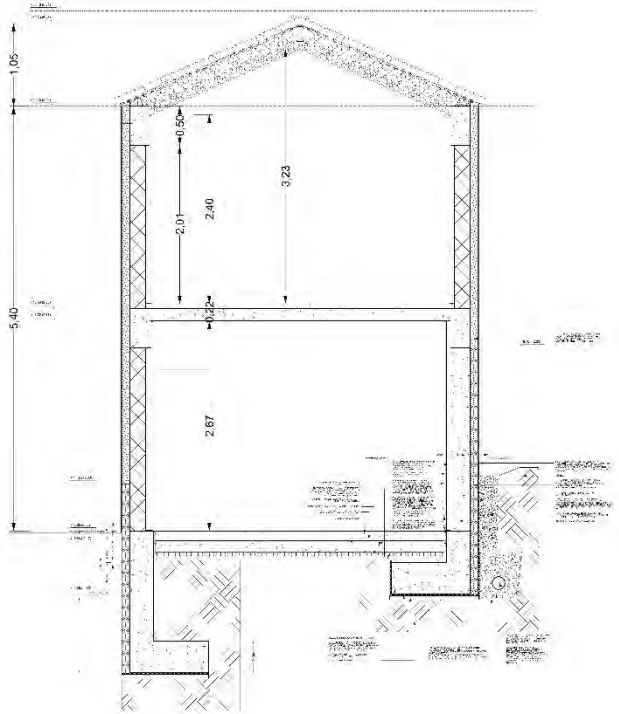
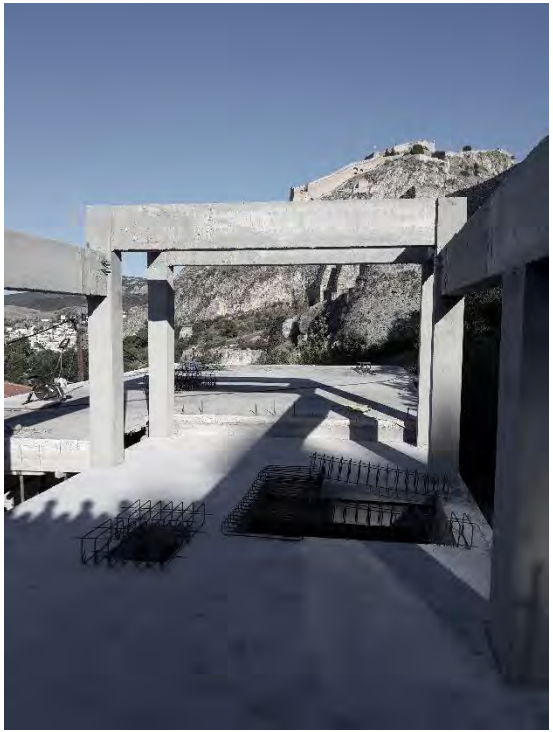
RESTRICTIONS: ARCHAEOLOGY DEPARTMENT





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RESTRICTIONS: ACCESS TO SITE

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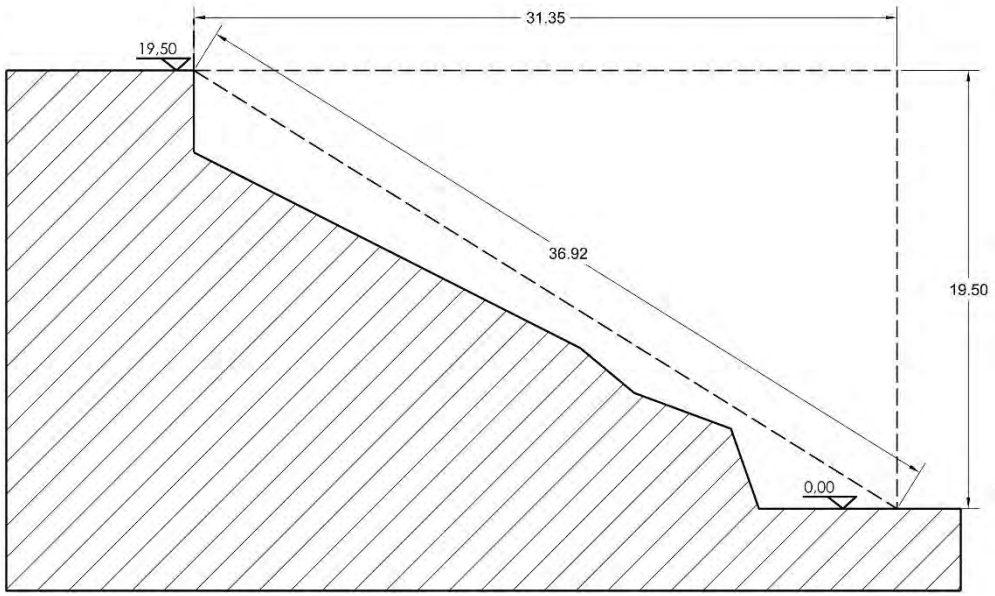

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RESTRICTIONS: STRUCTURAL ISSUES

APARTMENT 03

Place: Nafplion, Greece

Climate Zone: Warm (Athens)

TFA: 158 m^2

Occupants: 4.0

PHPP Result Overview

Heating Demand: 12.6 kWh/(m^2a)

Heating Load: 11.6 W/m^2

Cooling Demand: 12.9 kWh/(m^2a)

Cooling Load: 10.2 W/m^2

PER Demand: 52.7 kWh/(m^2a)

ENVELOPE

WALLS

Thermal Conductivity UT

YTONG PP2: 0.180 W/(m²K)

YTONG PP4: 0.179 W/(m²K)

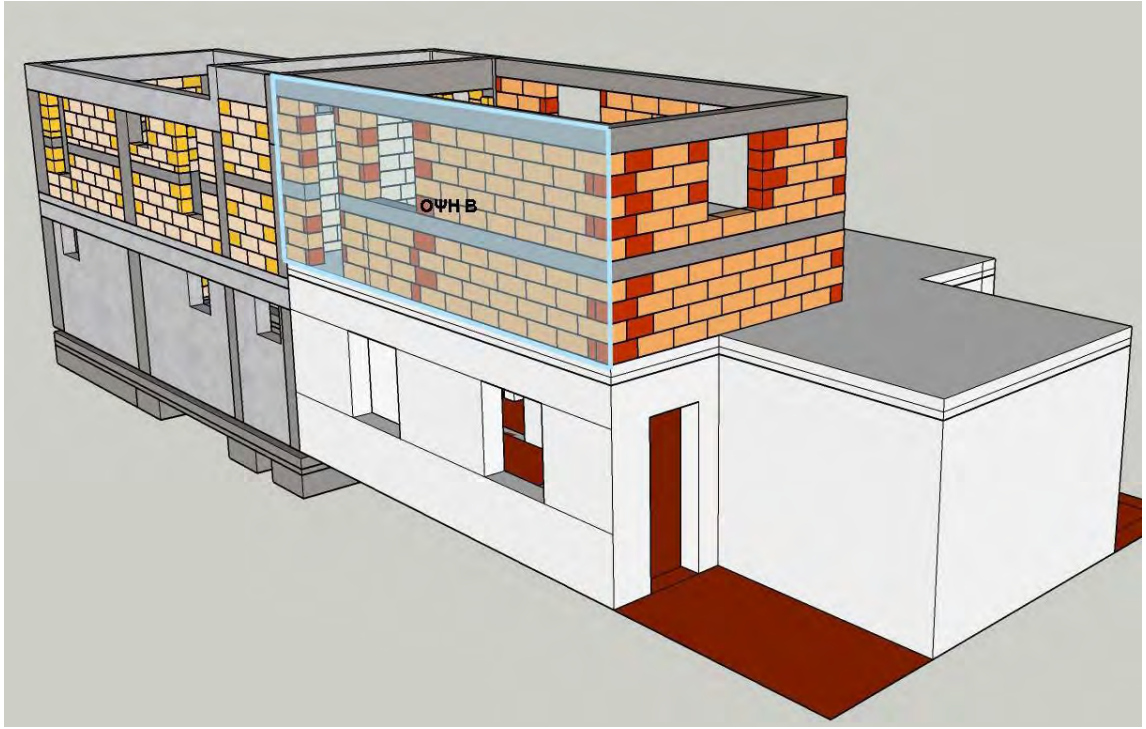
Brick Wall Stone: 0.233 W/(m²K)

Concrete Wall: 0.283 W/(m²K)

Average Weighted U-Value

Wall Ambient: 0.225 W/(m²K)

d: 100mm (λ=0,030 W/mK)



ENVELOPE

ROOF

Mineral Wool

d=250 mm, λ=0.033 W/mK

U=0.121 W/(m²K)

ROOF SLAB

EPS Board

d=150 mm, λ=0.030 W/mK

U=0.187 W/(m²K)

FLOOR SLAB

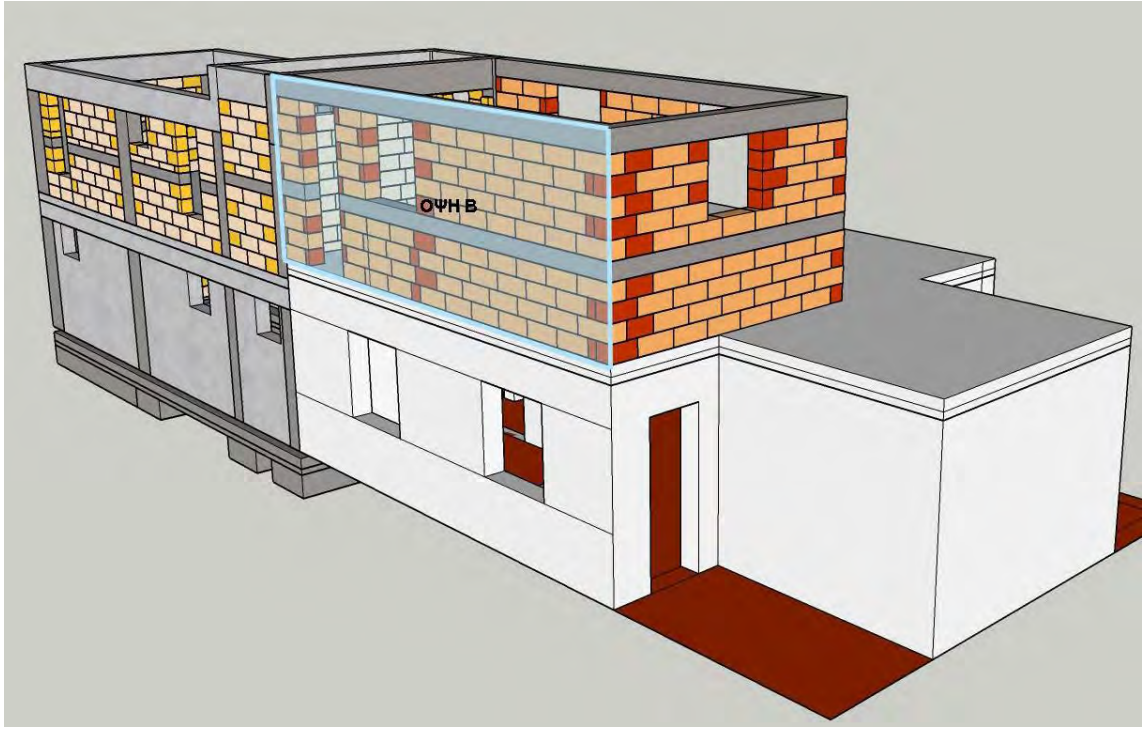
EPS Board

d=30 mm, λ=0.030 W/mK

U=0.799 W/(m²K)

Average Weighted U-Value

0.247 W/(m²K)



ENVELOPE

WINDOW AREA

North: 28.14 m^2

South: 8.49 m^2

East: 0.79 m^2

West: 0.00 m^2

Technical Specifications

Triple Glazing (4:14/4/14/:4 Ar)

Uw=0.95-1.08 W/(m^2K)

Ug=0.60 W/(m^2K)

Uf=1.20 W/(m^2K)

g-value: 0.60

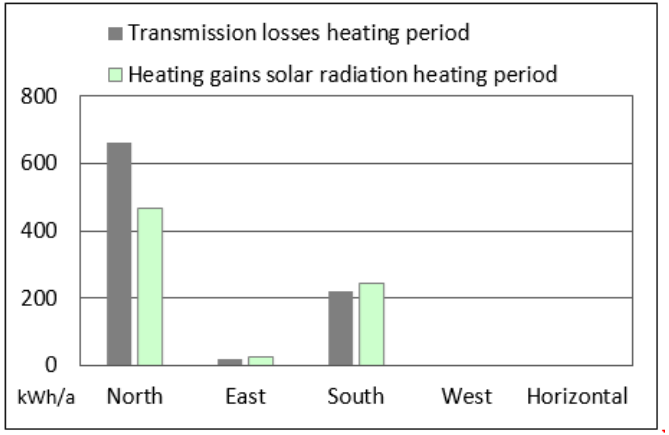
Ψglazing: 0.027 (W/mK)

Ψ(installed): 0.075-0.086 W/(mK)

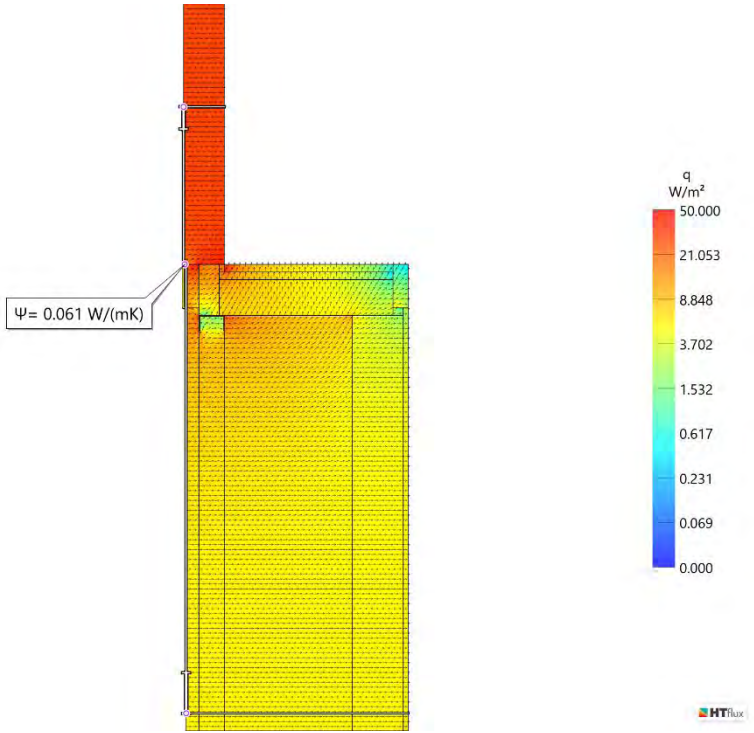
Average Weighted U-value

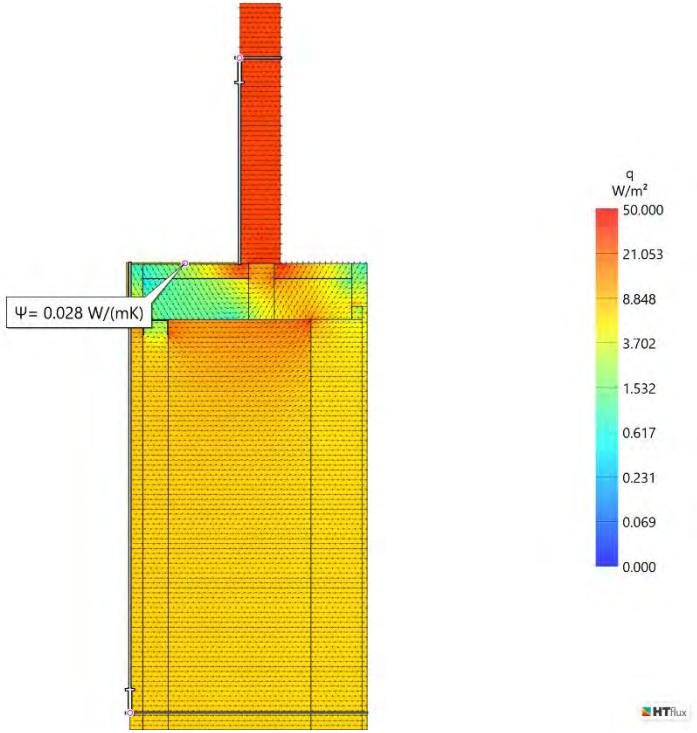
0.98 W/(m^2K)

Transmission losses heating period kWh/a	Heating gains solar radiation heating period kWh/a
664	467
21	27
222	243
0	0
0	0
907	737



THERMAL BRIDGES





SHADING

Orientation	Glazing area [m²]	Reduction factor winter r_v	Reduction factor cooling $r_{v,1}$	Reduction factor cooling load $r_{v,2}$	Solar load [kWh/($m^2_{Glazing}$a)]
North	18,41	85%	32%	19%	49
East	0,42	66%	31%	18%	107
South	4,81	38%	19%	11%	62
West	0,00	100%	100%	100%	0
Horizontal	0,00	100%	100%	100%	0

MHRV SYSTEM

DESIGN

GF: V_{SUP}=130 m³/h, V_{ETA}=130 m³/h

V_{TRANS}=80 m³/h

FF: V_{SUP}=110 m³/h, V_{ETA}=110 m³/h

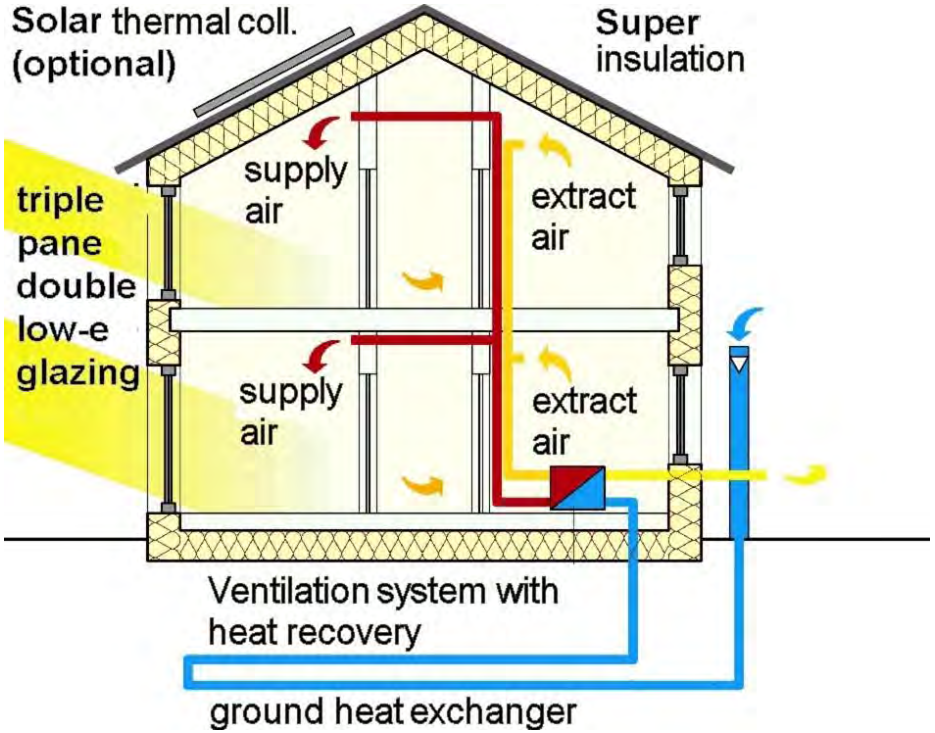
SUM: V_{SUP}=240 m³/h, V_{ETA}=240 m³/h

INSTALLATION

WOLF CWL-F 300 Excellent

V_{SUP} = 65-226 m3/h

Efficiency: 85%



GROUND AIR HEAT EXCHANGER

DESIGN

Pipe: Φ200 PP

Type: Meander

Building Volume: V=395 m3/h

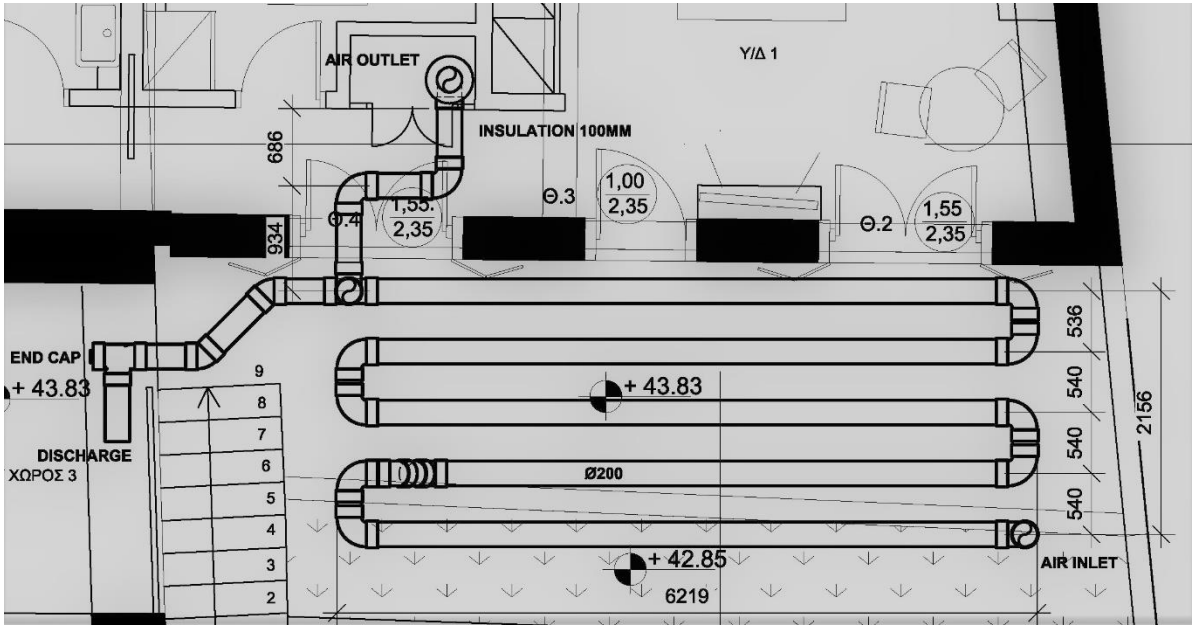
Supply: V_{SUP}=240 m3/h

Installation Depth: h=1.80-1.50 m

Slope: J=2 cm/m

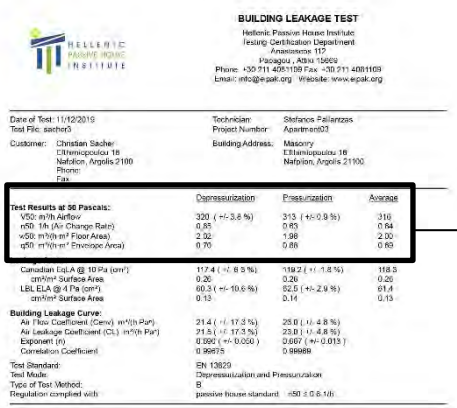
Length: L=34 m

Efficiency: η > 0.65 (65%)



GROUND AIR HEAT EXCHANGER

BLOWER DOOR TEST



BUILDING LEAKAGE TEST

Hellenic Passive House Institute
Testing Certification Department
Anaxagorou 117
Pacagiou, Athina 15669
Phone: +30 211 4061109 Fax: +30 211 4061109
Email: info@e-pak.org Website: www.epak.org

Date of Test: 11/12/2019
Test File: sacher3

Technician: Stefanos Pallantzas
Project Number: Apartment03

Customer: Christian Sacher
Dhimopoulou 18
Nafplion, Argolis 21100
Phone:
Fax

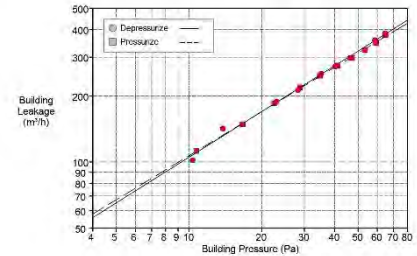
Building Address: Masonry
Dhimopoulou 18
Nafplion, Argolis 21100

Test Results at 50 Pascals:	Depressurization	Pressurization	Average
V50: m³/h Airflow	320 (+/- 3.8 %)	313 (+/- 0.9 %)	316
n50: 1/h (Air Change Rate)	0.85	0.83	0.84
w50: m³/(h·m² Floor Area)	2.02	1.98	2.00
q50: m³/(h·m² Envelope Area)	0.70	0.68	0.69
Canadian EqLA @ 10 Pa (cm²)	117.4 (+/- 8.5 %)	119.2 (+/- 1.8 %)	118.3
cm²/m² Surface Area	0.26	0.26	0.26
LBL ELA @ 4 Pa (cm²)	60.3 (+/- 10.6 %)	62.5 (+/- 2.9 %)	61.4
cm²/m² Surface Area	0.13	0.14	0.13

Building Leakage Curve:

Air Flow Coefficient (Cenv)	m³/(h·Pa²)	21.4 (+/- 17.3 %)	25.0 (+/- 4.8 %)
Air Leakage Coefficient (CL)	m³/(h·Pa²)	21.5 (+/- 17.3 %)	25.0 (+/- 4.8 %)
Exponent (n)		0.690 (+/- 0.000)	0.667 (+/- 0.013)
Correlation Coefficient		0.99975	0.99989

Test Standard: EN 13829
Test Mode: Depressurization and Pressurization
Type of Test Method: B
Regulation complied with: passive house standard n50 ≤ 0.6 1/h



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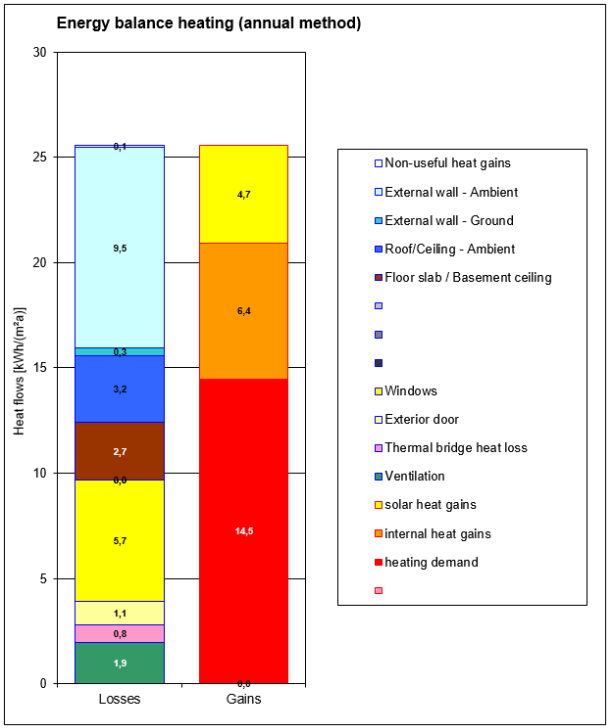
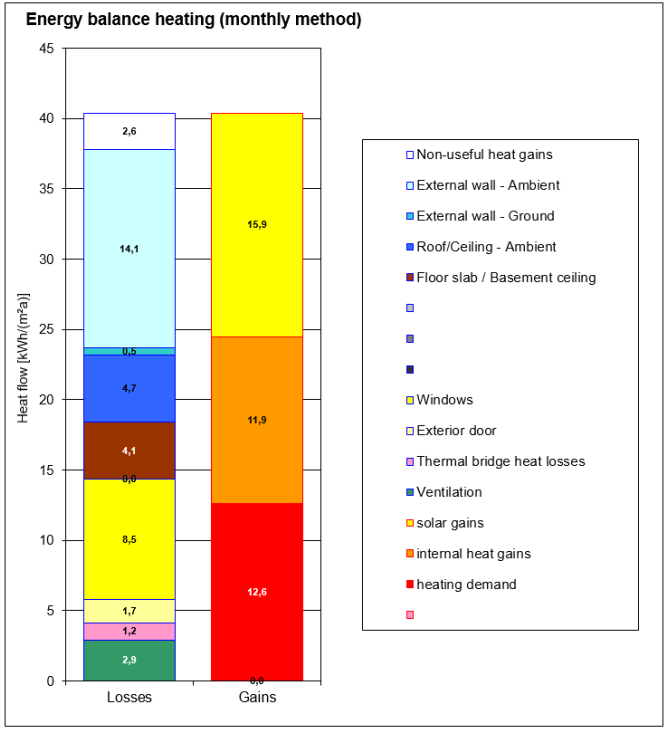
PHPP RESULTS - HEATING





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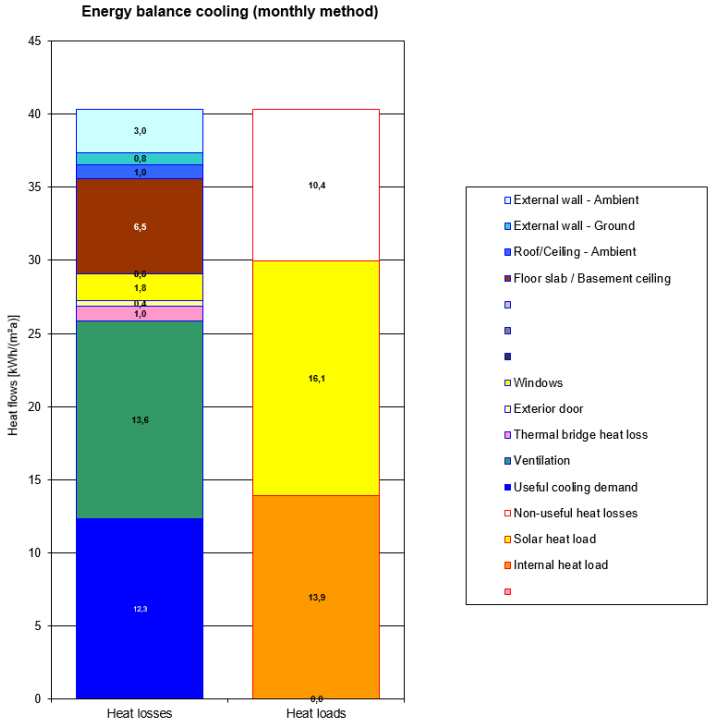
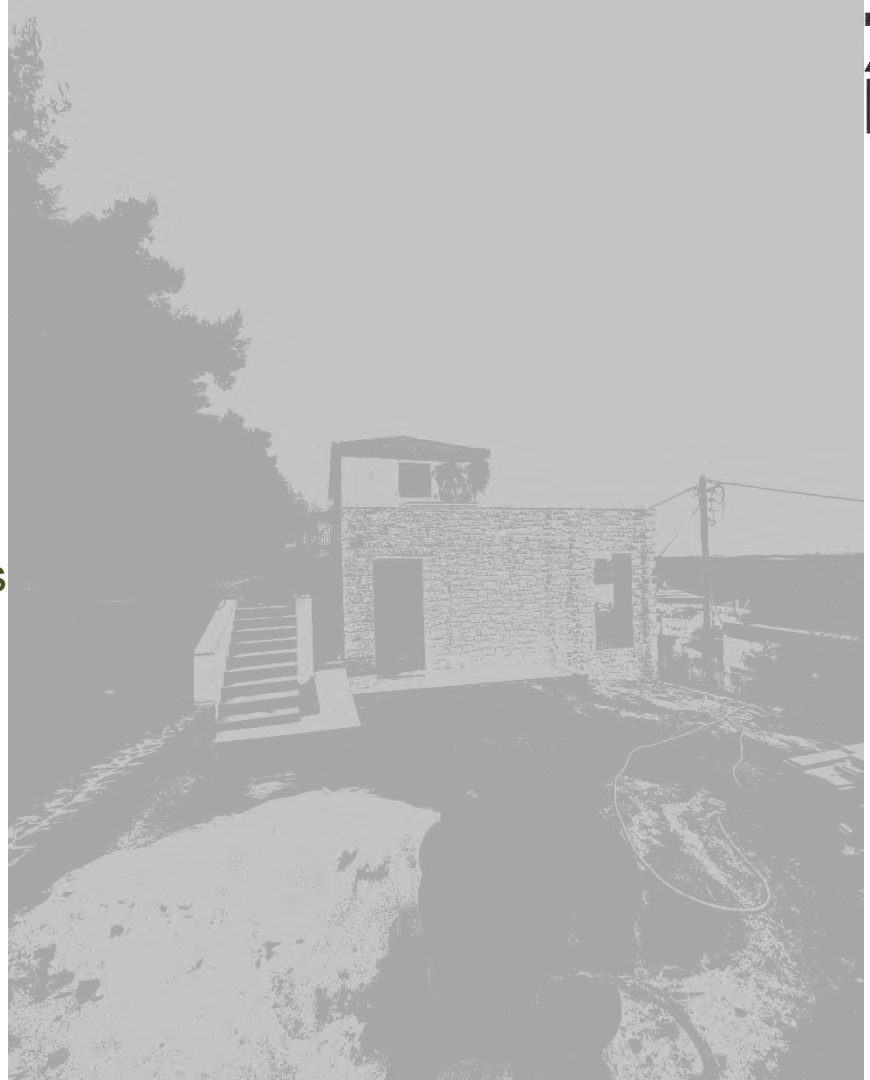
Speaker's Name & Institution: **Pavlos M. - 02 Architecture & Mech. Engineering – Mechanical Engineer**

PHPP RESULTS - COOLING



Thank you

Questions and Comments



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