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CASE STUDIES

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Izodom is a family company with 25 years of experience. It specialises in energy-efficient construction solutions. We export more than 90% of the manufactured products to Scandinavian and West European markets. So far, the Izodom technology has been used to construct 18,000 buildings worldwide.

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Editorial: Martyna Młodzikowska - Izodom 2000 Polska

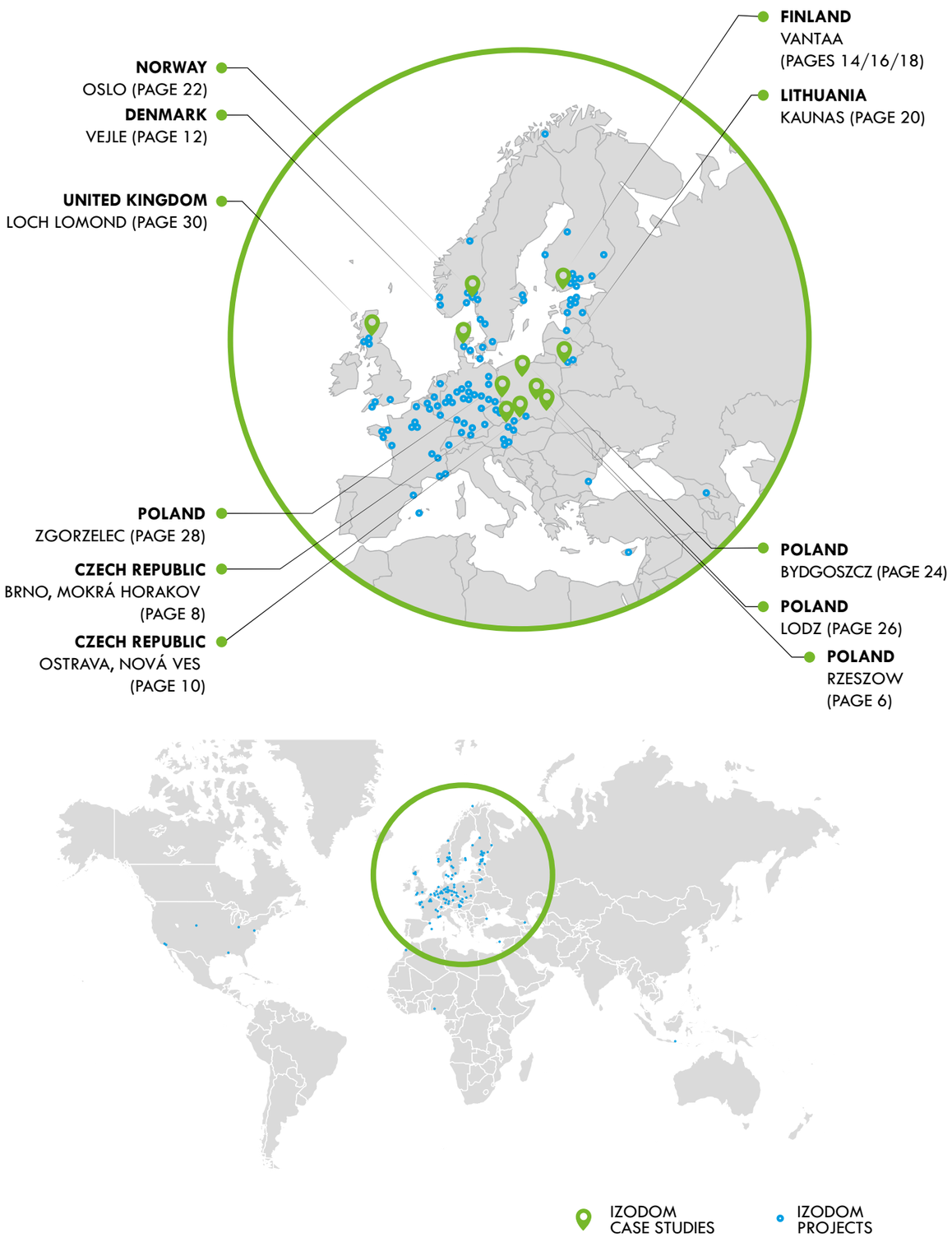
Izodom is a construction material manufacturer operating in the market for over 25 years. During this time we have assisted in the completion of over 18,000 projects worldwide. Izodom buildings can be found on every continent (except for the Antarctica). Each of the projects completed is unique and different but all of them have one common feature: all the buildings are energy efficient and the construction time is much shorter in comparison to the conventional building system. Izodom also makes sure that all the materials comply with the latest standards. Among others, we are a part of "Caring for Climate" United Nations environmental initiative, EU Gateway Programme by the European Commission and "Greenevo Technology Accelerator" awarded by the Polish Minister of Environment. Since 2007 our products have been fully certified on the territory of the European Union based on "ETA-07/0117". Izodom is also a Passive Building Ambassador with the Passivhaus Institut in Darmstadt.

This catalogue is a set of the best case studies from all over Europe, which presents different approaches in achieving low energy consumption in houses that are designed and executed in the Izodom technology. The presented projects vary from traditionally looking buildings. They constitute state-of-the-art constructions, which not only fulfill passive house requirements but also feature excellent aesthetic values and follow the latest architectural trends.

Should you wish to join a network of over 500 business partners worldwide, please do not hesitate to contact us.

Andrzej Wojcik
Izodom CEO

IZODOM EUROPEAN PASSIVE HOUSES



ARCHITECTS
by country

Czech Republik

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Glasgow, G81 2NR, UK

POLAND
RZESZÓW

What: **Single-family house**[1]
Function: **Residential**
Where: **Rzeszów, Poland**
Client: **Private customer**
Architect: **BXBstudio Bogusław Barnaś**[2]
Execution: **self-built**
Energy calculations: **N/A**
Area of the building: **215 m²**
Total construction time: **N/A**
Construction commencement: **2011**
Habited since: **2015**
Approximate construction cost (installations excluded): **N/A**

1.34 €/m² energy cost per year

80% savings on hot water and heating bills

Izodom elements:

FLP (U_0=0.09 W/m²K)
Peripor (ground slab)

MC 2/45 (U=0.10 W/m²K)
Neopor (wall elements)

Outside walls:
U=0.10 W/m²K

Made of the Izodom system:
- plaster rendering
- 150 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 12.5 mm plaster board
- finish

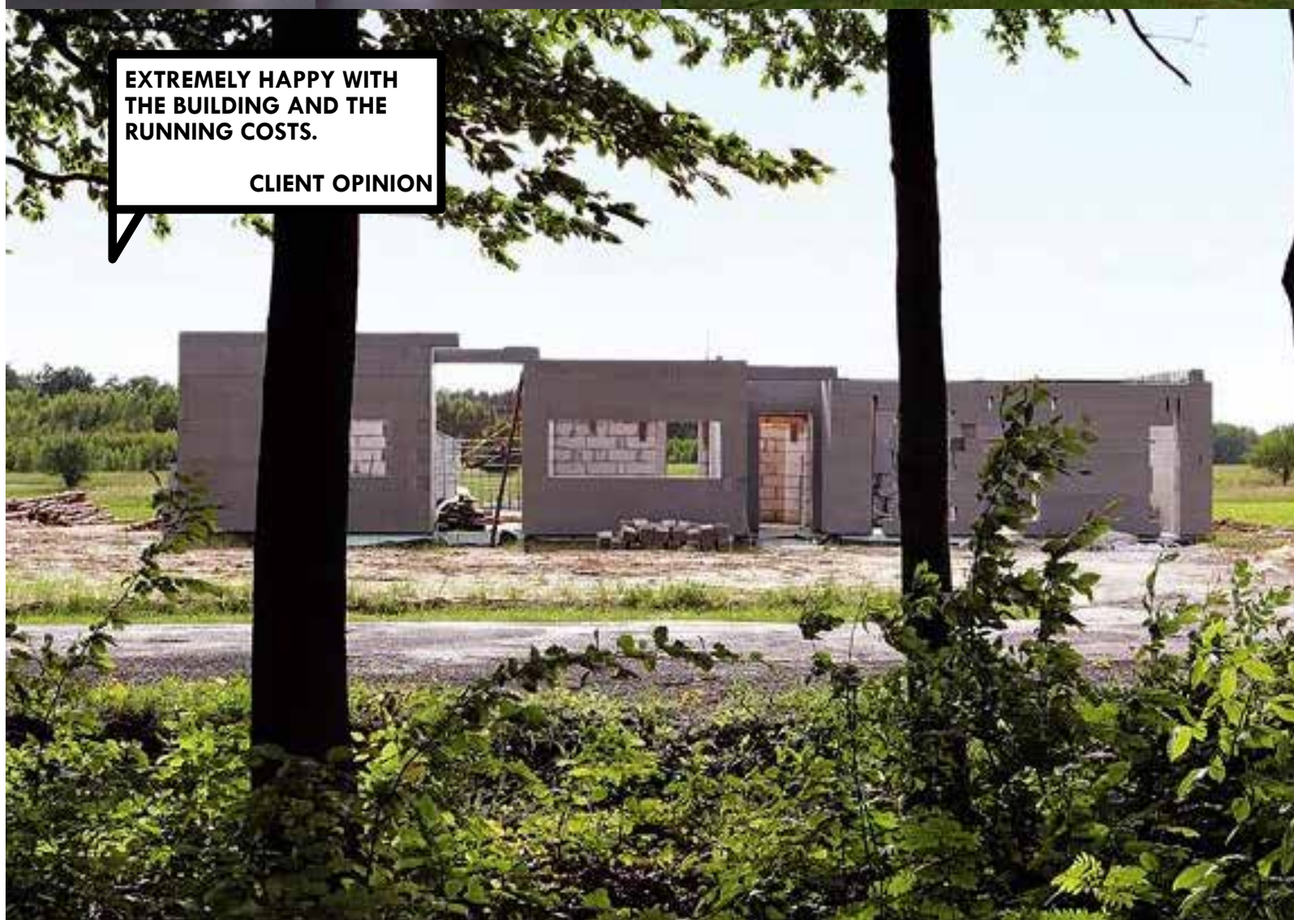
Basement floors to the ground:
U=0.10 W/m²K

Made of the Izodom system:
- floor covering
- compressed sand and gravel
- 250 mm ground slab insulation formwork (the Izodom system – Peripor)
- DPM
- 250 mm reinforced concrete
- floor finish

Roof: flat roof with water collection system (no other information available)
Ecological solutions applied in the house:
- Water collection system from the roof (volume: 1,000 m³) (water will be used in the garden and for other sanitary purposes)
- Water treatment plant installed on the plot
Main heat source: Floor heating
Additional heat source: Wood burning stove (connected to the ventilation unit)
Cooling system: none
Ventilation: Mechanical with a heat recovery unit

Energy consumption per year[3]**:**
<15 kWh/m²
Energy cost per year[4]**:**
6.04 PLN/m² (1.35 €/m²)
Which means 80% savings on heating costs when compared to a standard building of this type.
Standard heating costs for the building from that time[5]**:** 659.26 PLN – 30.66 PLN/m²€

TV PROGRAMME ABOUT THE BUILDING AVAILABLE ONLINE. SEE: "DOMY PRZYSZŁOŚCI ODCINEK 3" (HOUSES OF THE FUTURTE – AVAILABLE IN POLISH) [1]



EXTREMELY HAPPY WITH THE BUILDING AND THE RUNNING COSTS.

CLIENT OPINION

[1] Information about the building from the designer website www.bxbstudio.com/project/14 and from the TV program "Houses of the Future" ("Domy Przyszłości") at www.youtube.com/watch?v=vUbK4mmNViA (in Polish). [2] Available at: www.bxbstudio.com [3] The estimate based on information provided by the client. [4] Costs for the entire building: PLN 1,300 (EUR 294). [5] Estimate based at www.ag-dar.vaillant-partner.pl/kalkulatory-on-line/kalkulator-kosztow-ogrzewania-domu-i-podgrzewania-cieplej-wody-uzytkowej and www.ogrzewanie.drewnozamiastbenzyny.pl/ogrzewanie-podlogowe both available on 11.05.2016 .

CZECH REPUBLIC
BRNO, MOKRÁ HORAKOV

93% savings on hot water and heating bills

What: **Energy-efficient single-family house**
Function: **Residential**
Where: **Brno, Mokrá Horakov**
Client: **Martin Matyáš**[2]
Architect: **Ing. Petr Šoukal**
Area of the building: **80 m²**
Construction commencement: **July 2014**
Habited since: **construction not completed, uninhabited building**
Approximate construction costs (installations excluded): **N/A (building not completed)**
Man-hours necessary to build 1m²: **N/A**
Time for Izodom construction of 1 storey[3]:
- Foundation – 2 days
- External walls – 3 days
- Floor – 2 days

Total construction time: **N/A**

Izodom elements:

FPL (U_0=0.14-0.09 W/m²K) Peripor (ground slab)
STP (U_0=0.26-0.32 W/m²K) Neopor (floor)
MC 2/35 (U_0=0.15 W/m²K) Neopor (wall elements)
MCFU 2/25 (U_0=0.28 - 0.10 W/m² K) Neopor (wall elements)

Outside walls:
U=0.15 W/m²K

Made of the Izodom system:
- 10 mm plaster finish
- 35 mm fibre cement board
- 50 mm insulation (Neopor)
- 150 mm reinforced concrete
- 150 mm insulation (Neopor)
- 35 mm fibre cement board
- 20 mm plaster finish

Basement floors to the ground:
U=0.14 W/m²K

Made of the Izodom system:
- 10 mm floor finish
- 40 mm waterproof screed
- 50 mm floor heating system
- 250 mm insulation (Izodom ground slab)
- 100 mm reinforced concrete
- 150 mm compacted soil

Basement wall (against soil):
U=0.15 W/m²K
- 10 mm plaster finish
- 35 mm fibre cement board
- 50 mm insulation (Neopor)
- 150 mm reinforced concrete
- 150 mm insulation (Neopor)
- 35 mm fibre cement board
- 10 mm plaster
- DPM
- 200 - 500 mm gravel drainage backfill
- compacted soil

Floor:
Made of the Izodom system:
- 10 mm floor finish
- 40 mm waterproof screed
- 50 mm floor heating system
- 50 mm Izodom floor system (Neopor + reinforced concrete)
- 22 mm plaster board

Roof:
U=0.10 W/m²K
- 60 mm gravel
- green roof system fabric and waterproofing (Filtec 300)
- 300 mm insulation (EPS Polystyrene)
- DPM
- 32 mm decking planks
- Load bearing roof joists 140 / 200

Roof inclination: 6 %

Main heat source: Floor heating
Cooling system: Ventilation with heat recovery system
Ventilation:
- Ventilation with heat recovery system

Tightness: N/A

Energy consumption per year:
<20 kWh/m²
Energy cost per year:[4]
2.74 €/m²
Which means 93 % savings on heating and hot water costs when compared to a standard building of this type.
Standard heating costs for the building from that time:[5] 983.15 Kč/m² (36.35 €/m²)

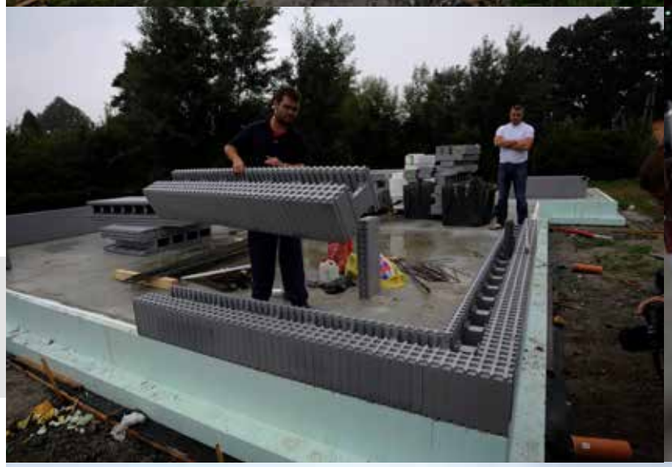
[1]*As specified by the contractor (information provided by Vítězslav Fojtík).* [2]*The information about the specialist available at: http://rejstrik.finance.cz/13669702-ing-petr-soukal .* [3] *The works described in this section were executed by 4 workers.* [4] *For the entire building: EUR 219 (appropriate value based on the assumptions provided by Vítězslav Fojtík).* [5] *Standard costs for the building according to "D2.1a - Survey on the energy needs and architectural features of the EU building stock" from iNSPiRe, webpage: www.inspirefp7.eu (available on 10.03.2016) and www.energie123.cz/elektrina/ceny-elektricke-energie/cena-1-kwh (available on 23.03.2016).*

CZECH REPUBLIC
OSTRAVA, Nová Ves

What: **Low energy single-family house**
Function: **Residential**
Where: **Ostrava-Nová Ves**
Client: **MBC Kudláček**
Architect: **STUDIO ATRIUM Lelek, Godlewski sp. j.** [1]
Area of the building: **117 m²**
Construction commencement: **August 2014**
Habited since: **building uninhabited**
Approximate construction cost (installations excluded):
79 534 € (2 150 000 Kč)
Time for Izodom construction[2]: **3 weeks**
Total construction time: **N/A**

21 kWh/m² energy consumption per year [3]

92% savings on hot water and heating bills



Izodom elements:

FPL (U_0=0.14-0.09 W/m²K) Peripor (ground slab)
MC 2/35 (U_0=0.15 W/m²K) Neopor (walls)

Outside walls:
U=0.15 W/m²K

Made of the Izodom system:
- plaster rendering
- 150 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 12.5 mm plaster board
- finish

Roof:
U=0.12 W/m²K
- concrete folded roofing tiles
- 50 x 50 mm wooden battens
- safety waterproofing
- 60 x 200 mm truss system
- 200 mm insulation (mineral wool)
- steel frame
- 100 mm insulation (mineral wool)
- damp screen
- 12 mm gypsum board

Roof inclination: 42 %

Basement floors to the ground:
U=0.14 W/m²K

Made of the Izodom system:
- 15 mm laminate flooring
- Underlay foam pads
- 3 – 15 mm self-levelling compound
- 250 mm reinforced concrete foundation slab
- 250 mm insulation (the Izodom system – Peripor)
- protective geotextile
- 15 mm DPM
- 40 mm compacted sand
- 310 – 410 mm compacted gravel subbase

Floor:
Made of the Izodom system:
- 15 mm laminate flooring
- underlay foam mat
- 3 – 15 mm self-levelling compound
- 250 mm the Izodom system ceiling (polystyrene + reinforced concrete)
- lime plaster

Main heat source: Floor heating
Additional heat source: Fireplace (possible to connect with a heat distribution system)
Cooling system: none
Ventilation: gravitational
Tightness: N/A

Energy consumption per year:[3]
21 kWh/m²
Energy cost per year:[4]
76.92 Kč/m² (2.85 €/m²)
Which means 92 % savings on heating and hot water costs when compared to a standard building of this type.
Standard heating costs for the building from that time[5]**:** 983.15 Kč/m² (36.35 €/m²)

[1] S-GL-539-Roleks-Bis "STUDIO ATRIUM" ready project (www.studioatrium.pl). [2] Work performed by 4 workers, with no experience in the Izodom system. [3] The value calculated from the energy bills provided by the contractor. [4] For the entire building: 9 000 Kč (EUR 333) – Building used as a reference model. [4] Standard costs for the building according to "D2.1a - Survey on the energy needs and architectural features of the EU building stock" from iNSPiRe, webpage: www.inspirefp7.eu (available on 10.03.2016) and www.energie123.cz/elektrina/ceny-elektricke-energie/cena-1-kwh (available on 23.03.2016).

DENMARK
VEJLE

13 kWh/m² energy consumption per year

78 % lower than required

What: **Single-family house; new construction**
Function: **Residential**
Where: **Skorpionvej 4, 7100 Vejle, Denmark**
Client: **Anni og Jesper Steffensen**
Architect: **PlusEnergiByg A/S – Karolina Nesterowicz**
Energy calculations[1]: **Karolina Nesterowicz**
Building area: **331 m²**
Construction commencement: **November 2013**
Habited since: **May 2014**
Approximate construction cost (for handing over)[2]: **8 000 dkk/m² (1 071 €/m²)**
Man-hours necessary to build 1m² of the Izodom elements: **1.5 man-hour/m² of a wall (with additional works such as installations)**
Total construction time: **7 months (prolonged by winter and holidays)**

Izodom elements:

MC 2/45 (U_0=0.10 W/m²K) Neopor (wall elements)
ML 1/45 (U_0=0.10 W/m²K) Neopor (wall elements)
OC Neopor (wall elements)
MCFU 2/25 (U_0=0.28 W/m²K) Neopor (wall elements)

Outside walls:
U=0.08 W/m²K [3]

Made of the Izodom system:
- 250 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 10 mm plaster rendering

Foundation and basement floor:
U=0.08 W/m²K

Sundolitt foundation system:
- compressed sand
- 350 mm polystyrene
- vapour barrier
- floor heating system
- 250 mm reinforced in-situ concrete
- floor finish

Roof:
U=0.08 W/m²K

Roofing system on wooden trusses:
- 2 x 12.5 mm plaster boards
- 21x100 mm wooden cross formwork
- pipes for ventilation
- 45x195 mm wooden roof battens; cavities filled with 195 mm mineral wool
- vapour barrier
- 45x295 mm truss beams (at 600 mm centres); cavities filled with 300 mm mineral wool
- roofing felt

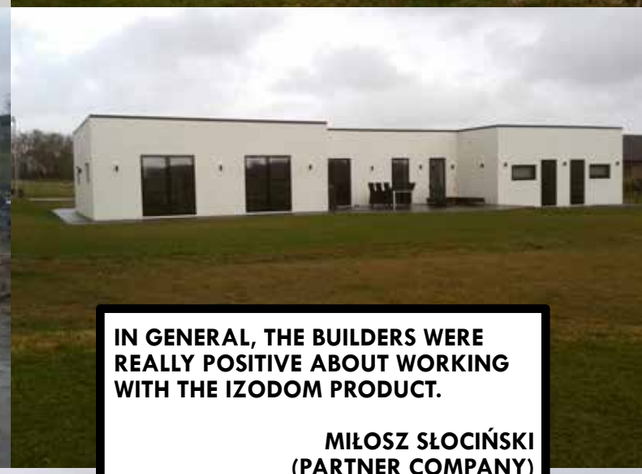
Windows:
max U=1.16 W/m²K
Glass only U=0.6 W/m²K
Vrogum – Svarre triple glazed windows with stained glass edge, wooden frame
Main heat source: Electrical heating system – floor heating system
Additional heat source: Heat pump (company: Nilan, model: Compact P JVP (JVP 105), type: duo, one unit) / Photo-voltaic panels (area: 40 m², orientation: south, peak power: 0.16 kW/m², system efficiency: 0.6)

Cooling system: None
Ventilation: natural ventilation (system tightness[4]: 1.5 l/sm²)
Energy consumption [5] **(per year):**
13 kWh/m²
The building energy consumption is 78% lower than required.[6]
Energy frame requirements for:
BR2010 - 58.4 kWh/m² | BR2015 - 33.6 kWh/m² | BR2020 - 20.0 kWh/m²
BR2020 requirements concerning minimum insulation are fulfilled.
All energy consumption requirements are fulfilled.

Overall transmission losses: 8.2 W/m²
Overall heat loss without heat recovery unit: 19.8 W/m²
Overall heat loss with heat recovery unit: 19.8 W/m²

Energy cost per year:[7]
28.33 DKK/m² (EUR 3.80)
Which means 81% savings on heating and hot water costs when compared to a standard building of this type.
Standard heating costs for the building from that time:[8] 148.24 DKK (EUR 19.87)

[1] Calculated according to: Bygningsreglementet 2010, BR10 (Danish Building Regulations 2010). [2] Including installations and internal finishes. [3] Technical specification on the drawings; U= 0.10 W/m²K – according to Izodom). [4] Calculations made by Karolina Nesterowicz in an overall energy calculation. [5] Calculated with Rockwool Energy Design 4.0.92. [6] In comparison to: Bygningsreglementet 2010 (Danish Building Regulations 2010). [7] For the entire building: 9,380 DKK (EUR 1,257). [8] According to: SBI 2013:25 „Cost-optimal levels of minimum energy performance requirements in the Danish Building Regulations" and the information provided at www.energitilsynet.dk



IN GENERAL, THE BUILDERS WERE REALLY POSITIVE ABOUT WORKING WITH THE IZODOM PRODUCT.

MIŁOSZ SŁOCIŃSKI (PARTNER COMPANY)

FINLAND
VANTAA

What: **Single-family house; new construction**
Function: **Residential**
Where: **Vantaa, Finland**
Client: **Janne and Piritta Halttu**
Execution: **HRT Group Ltd.**
Energy calculations: **N/A**
Area of the building: **220m²**
Construction commencement: **2013**
Habited since: **2014**
Approximate construction cost (installations excluded): **N/A**
Total construction time: **6 months**

1.80 €/m² energy cost per year [3]

90% savings on hot water and heating bills

GENERALLY RECOMMENDED PRODUCT.

JORMA VILMUSENAHO (PARTNER COMPANY)

Izodom elements:

MC 2/45 (U_0=0.10 W/m²K) Neopor (wall elements)

Outside walls:
U=0.10 W/m²K

Made of the Izodom system:
- plaster rendering
- 250 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 12.5 mm plaster board
- finish

Roof:
U=0.062 W/m²K
- roof finish
- battens
- underlay
- 500 mm thermal insulation
- DPM
- 12.5 mm plaster board ceiling

Basement floors:
U=0.12 W/m²K

- floor covering
- 120 mm in-situ concrete
- 200 mm thermal insulation
- compacted gravel

Floor:
- floor covering
- hollow-core slab
- finish

Main heat source: N/A
Additional heat source: N/A
Cooling system: N/A

Energy consumption per year:[2]
<15 kWh/m²
Energy cost per year:[3]
1.80 €/m²
Which means 90% savings on heating and hot water costs when compared to a standard building of this type.
Standard heating costs for the building from that time: 18.11 €/m²

[1] Information provided by Jorma Vilmusenaho (contractor). [2] The building complies with the passive house standards (information provided by Jorma Vilmusenaho). [3] For the entire building: EUR 396 (appropriate value based on the assumptions provided by Jorma Vilmusenaho). [4] Standard costs for the building according to "D2.1a - Survey on the energy needs and architectural features of the EU building stock" from iNSPiRe, (www.inspirefp7.eu - available on 10.03.2016) and documents provided by the contractor.

FINLAND
VANTAA

20 kWh/m² energy consumption per year [1]

What: **Two-Apartment Buildings (5 apartments in total); new construction**
Function: **Residential**
Where: **Urheilutie 13 01450 Vantaa, Finland**
Client: **WW Invest Ltd.**
Execution: **HRT Group Ltd.**
Architect: **Seppo Saulamaa – Arkantti Ltd.**
Sound calculations: **Eija-Halme Salo – Architects Alpo Halme Ltd.**
Blower door test: **Hannu Järvi – Certek Ltd.**
Area of the building: **450 m²**
Construction commencement: **2013**
Habited since: **2015**
Approximate construction cost (installations excluded): **N/A**
Total construction time: **12 months**

Izodom elements:

MC 2/35 (U_0=0.15 W/m²K) Neopor (wall elements)

Outside walls:
U=0.10 W/m²K

Made of the Izodom system:
- plaster rendering
- 150 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 12.5 mm plaster board
- finish

Basement floors:
U=0.16 W/m²K

- floor covering
- 100 mm concrete slab
- 200 mm thermal insulation (polystyrene / urethane)
- 200 mm compacted crushed stone

Floor:
- floor covering
- 70 mm concrete screed
- 30 mm insulation
- 200 mm concrete slab

Roof:
U=0.07 W/m²K
- roof covering (sheet metal, dark grey)
- battens
- underlay
- ventilation gap
- 500 mm thermal insulation
- DPM
- 47 mm joists
- 13 mm plasterboard

Windows: N/A
Main heat source: air-water heat pump
Cooling system: none
Ventilation: mechanical supply and exhaust
Tightness:
- q50 air leakage figure
Alip. 0.495 [m³/h*m²]
- n50 air leakage figure
Alip. 0.545 [1/h]
These results give the house tightness standard of a passive house (which is: q50 < 0.6)

Sound insulation:
Property located at the area where traffic noise is a level of 60-65 dB. The building shell is everywhere at least 35 dB against traffic noise.

Energy consumption per year:
<20 kWh/m²
Energy cost per year:
2.40 €/m²
Which means 87% savings on heating and hot water costs for the standard building this type.
Standard heating costs for the building from that time: 18.11 €

[1] *Information provided by Jorma Vilmusenaho (contractor).* [2] *All sound calculations done separately for each major area of the building by Eija-Halme Salo – AA-class acoustic designer (FISE); Dimensioning was based on absolute integrity of the structures. The inner envelope is sealed hermetically and windows are as air-tight as possible. The tightness of the system is achieved by using the Izodom technology.* [3] *For the entire building: EUR 1,080 (appropriate value based on the assumptions provided by Jorma Vilmusenaho).* [4] *Standard costs for the building according to "D2.1a - Survey on the energy needs and architectural features of the EU building stock" from iNSPiRe, (www.inspirefp7.eu - available on 10.03.2016) and documents provided by the contractor.*

EASY AND FAST TO BUILD EVEN IN WINTER

JORMA VILMUSENAHO (PARTNER COMPANY)

FINLAND
VANTAA

What: **Terraced house (2 floors, 9 apartments); new construction**
Function: **Residential**
Where: **Vantaa, Finland**
Client: **Kisapolku building co-operative**
Architect: **N/A**
Energy calculations: **N/A**
Building area: **723m² 11 flats 72 m² each**
Construction commencement: **N/A**
Habited since: **2012**
Approximate construction cost (without installations): **N/A**
Man-hours necessary to build 1m² of the building: **N/A**
Total construction time: **N/A**

23 kWh/m² energy consumption per year [1]

85% savings on hot water and heating bills

Izodom elements:

MC 2/45 (U_0=0.10 W/m²K) Neopor (wall elements)

Outside walls: N/A

Foundation and basement floor: N/A

Roof: N/A

Windows: N/A

Main heat source: Geothermal heating
Ventilation: Mechanical with heat recovery unit
Tightness: no information available

Energy consumption per year[1]
23 kWh/m²
Total energy produced by the building:
220.241 kWh

Energy cost per year[2]**:** 2.73 €/m²
Which means 85% savings on heating and hot water costs when compared to a standard building of this type.

Standard heating costs for the building from that time[3]**: 18.11 €**

[1] Based on the energy bill issued by: "Vantaan Energia Sähköverkot OY", www.vantaanenergiasahkoverkot.fi, contact: 09 8290 900 [2] For the entire building: EUR 1,981 [3] Standard costs for the building according to "D2.1a - Survey on the energy needs and architectural features of the EU building stock" from iNSPiRe, www.inspirefp7.eu (available on 10.03.2016) and documents provided by the contractor.

LITHUANIA
KAUNAS

What: **Multi-story block of flats (24 apartments); new construction**
Function: **Residential**
Where: **Verkių g. 48 Kaunas, Lithuania**
Client: **Būstuva, Ltd.**[1]
Architect: **VYTATANAS, Vytenis Andrenas**
Execution: **KA Projektai, Ltd.**
Energy calculations: **Andrew Kirklys**
Floor area of the building: **2,043.49 m²**
Construction commencement: **2015**
Habited since: **not habited yet**
Time for construction of 1 storey: **3 weeks**
Total construction time: **5.5 month**

Izodom elements:

MCF 1/30+ (U_0=0.28 W/m²K) Neopor (wall elements)
MC 2/45 (U_0=0.10 W/m²K) Neopor (wall elements)

Outside walls:
R=9.516 m²K/W / U=0.11 W/m²K

Made of the Izodom system:
- min 10 mm structural plaster finish
- 250 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- min 10 mm plaster rendering

Basement walls and floors to the ground:
R=6.049 m²K/W / U=0.17 W/m²K

- 150 mm polystyrene EPS (on the outside)
- 500 mm concrete
- 100 mm SPU insulation (on the inside; λdec < 0.023W/mK)

Floor construction against unheated parts of the building:
R=8.032 m²K/W / U=0.12 W/m²K

- 200 mm in-situ concrete
- 200 mm SPU insulation (λdec < 0.023W/mK)
- 60 mm in-situ concrete

Roof:
R=9.900 m²K/W / U=0.10 W/m²K

- 200 mm concrete slab
- 250 mm SPU insulation (λdec < 0.023W/mK)
- 60 mm concrete layer
- waterproof roof finish

Windows: U=0.73 W/m²K
Veka – Alphaline 90 MD+ plastic profile windows, triple glazed, air permeability class 4, light permeability coefficient 0.59. Windows installed at least 30 mm to the outside of concrete section on glass fibre pins (to avoid thermal bridges).

Balconies mounted as a separate structure, without linear thermal bridges
Staircases and doors in the basement: U=1.3 W/m²K, air permeability class 3
Main heat source: Connected to district heating network
Additional heat source: Water heating unit in the building
Cooling system: None
Ventilation: Mechanical with heat recovery system in the apartments (system performance ratio: 0.93). Additional ventilation ductwork system for the staircases (efficiency coefficient: 0.80)

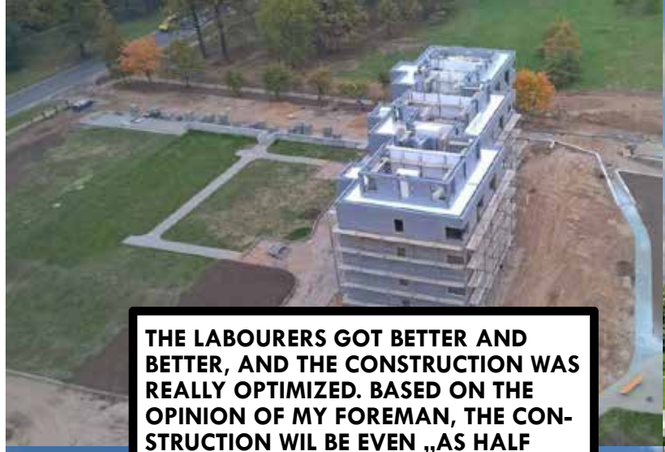
Tightness of the building must not exceed 0.6 times/h with the difference of 50 Pa pressure between the inside and outside. The building leak test is executed as specified in LST EN I3829: 2002 "Thermal characteristics of buildings. Determination of air permeability of buildings. Pressure difference method (ISO 9972:1996, as amended)".

Energy consumption per year:[3]
12 kWh/m²
Non-renewable primary energy input:
134.83 W/m²K
Renewable primary energy input:
12.08 W/m²K
Indicators of the designed building meet the requirements for A+ energy efficiency class in accordance with STR 2.01.09:2012 from 15-09-2014.

Energy cost per year:[4] 1.25 €/m²
Which means 90% savings on heating and hot water costs when compared to a standard building of this type.
Standard heating costs for the building from that time[5]**:** 12.78 €

The first apartment building in Lithuania to achieve energy class A+

[1] *More at: www.bustuva.lt/nauji-butai-kaune, address: Verkių g. 48, LT-44499 Kaunas, Lithuania; contact: info@bustuva.lt* [3] *Calculated with NRG3 3.1.0.3 software* [4] *For the entire building: EUR 2,550* [5] *According to Energy Efficiency Action Plan (Official Gazette., 2007, no. 76-3024) - „Dėl Energijos efektyvumo veiksmų plano patvirtinimo" (Žin., 2007, Nr. 76-3024) www.e-tar.lt/portal/index.html*



THE LABOURERS GOT BETTER AND BETTER, AND THE CONSTRUCTION WAS REALLY OPTIMIZED. BASED ON THE OPINION OF MY FOREMAN, THE CONSTRUCTION WIL BE EVEN „AS HALF EASIERNEXT TIME".

TADAS GUŽAUSKAS

NORWAY
OSLO

What: **Single-family house (2 storey); new construction**
Function: **Residential**
Where: **Oslo, Norway**
Client: **Private Customer**
Architect: **Kentenstina Design**
Execution: **Stokker Bygg AS** [2]
Total area of the building: **200 m²**
Construction commencement: **June 2014**
Habited since: **June 2015**
Approximate construction cost (installations excluded): **N/A**
Total construction time: **10 months**

15 kWh/m² energy consumption per year[1]

90% savings on hot water and heating bills

Izodom elements:

MC 2/45 (U=0.10 W/m²K)
Neopor (wall elements)

FPL (U=0.14-0.09 W/m²K)
Peripor (ground slab)

Outside walls:
U=0.10 W/m²K

Made of the Izodom system:
- 250 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 10 mm plaster rendering

Basement floors to the ground:
U=0.09 W/m²K

Made of the Izodom system:
- compressed sand and gravel
- 120 mm auxiliary ground slab insulation (Izodom system – Peripor)
- 250 mm ground slab insulation formwork (Izodom system – Peripor)
- DPM
- 250 mm reinforced concrete
- floor finish

Roof:
U=0.08 W/m²K

Made of the Izodom system:
- 21 mm panels of roof sheathing
- 73 mm ventilation gap
- wind foil
- 48 x 400 mm battens
- 400 mm insulation
- 36 mm barge board
- 25 mm gypsum board

Main heat source: electrical – floor heating
Additional heat source: N/A
Cooling system: none

Energy consumption per year:
<15 kWh/m²
Energy cost per year[3]**:** N/A
15 NOK/m² (1.60 €/m²)
Which means 90 % savings on heating and hot water costs when compared to a standard building of this type.
Standard heating costs for the building from that time[4]**:** 148 NOK/m²

VIDEOS FORM THE CONSTRUCTION PROCESS AVAILABLE AT THE IZODOM'S YOUTUBE PAGE

[1] *As specified by the contractor (information provided by Jakub Jaworski).* [2] *Information available at www.stokkerbygg.no* [3] *For the entire building: 3000 NOK (EUR 320).*
[4] *Standard costs for the building according to "Energy consumption in households, 2012" at www.ssb.no/en/energi-og-industri/statistikker/husenergi/hvert-3-aar/2014-07-14 (available on 10.05.2016) and "Electricity prices Q4, 2015" www.ssb.no/en/energi-og-industri/statistikker/elkraftpris/kvartal/2016-02-25; (counts in all energy commodities).*

POLAND
BYDGOSZCZ

What: **Single-family house**
Function: **Residential**
Where: **Bydgoszcz, Poland**
Client: **Andrzej Kielpiński**
Architect: **Ready-made project**[1]
Area of the building: **126 m²**
Construction commencement: **November 2013**
Total construction time: **8.5 months**
Habited since: **November 2014**
Approximate construction cost (installations excluded): **N/A**

Izodom elements:

FLP (U_0=0.14-0.09 W/m²K)
Peripor (ground slab)

MC 2/35 (U=0.15 W/m²K)
Neopor (wall elements)

MCFU 2/25 (U=0.28 - 0.10 W/m²K)
Neopor (wall elements)

Outside walls:
U=0.15 W/m²K

Made of the Izodom system:
- plaster rendering
- 150 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 12.5 mm plaster board
- finish

Basement floors to the ground:
U=0.14-0.09 W/m²K

Made of the Izodom system:
- floor finish
- 250 mm reinforced concrete foundation slab
- 250 mm insulation (the Izodom system – Peripor)
- 3 mm DPM
- 40 mm compacted sand
- 310 – 410 mm compacted gravel subbase

Floor: Wooden Floor (dimensions not specified)

Roof:
U=0.11 W/m²K

- Roof finish
- 50 x 50 mm wooden battens
- 60 x 200 mm truss system
- 300 mm insulation (mineral wool)
- DPM
- 12 mm gypsum board

Main heat source: electrical heating
Additional heat source: wood burning stove (with heat distribution channels)
Cooling system: none

Energy consumption per year[2]**:**
19 kWh/m²
Energy cost per year[3]**:**
11.66 PLN/m² (2.65 €/m²)
Which means 78% savings on heating costs when compared to a standard building of this type.
Together with other electricity costs (electrical utilities and lighting) the costs per year amount to: 15.15 PLN/m² (3.43 €/m²)
Standard heating costs for the building from that time[4] **:** 53.27 PLN/m² (12.11 €/m²)

[1] Adjusted by: Ryszard Kowalski, construction engineer and Mariusz Kończal, engineer. [2] The energy consumption is an estimate based on the information provided on the website: www.inez.com.pl/2015/01/22/jakie-placi-sie-rachunki-za-prad-przy-ogrzewaniu-energia-elektryczna-2014-rok. Heating energy usage was provided by the client together with total electricity usage. [3] Energy costs include all electricity costs (electrical utilities and lighting). The costs calculated on the basics of: www.muratordom.pl/instalacje/ogrzewanie-domu/koszt-ogrzewania-domu-energia-elektryczna-bedzie-drozej,222_9384.html, available on 19.05.2016. [4] Information to be found at: www.ag-dar.vaillant-partner.pl/kalkulatory-on-line/kalkulator-kosztow-ogrzewania-domu-i-podgrzewania-cieplej-wody-uzytkowej, available on: 19.05.2016.

POLAND
ŁÓDŹ

What: **Single-family House**
Function: **Residential**
Where: **Łódź, Poland**
Client: **Private customer**
Architect: **Atrium Studio, project GL 128**[1]
Execution: **Self-built (with additional support e.g. carpenter team))**
Energy calculations: **N/A**
Area of the building: **114 m²**
Construction commencement: **April 2004**
Habited since: **October 2004**
Approximate construction cost (installations excluded): **N/A**
Time for construction of Izodom elements: **3 weeks (including window carpentry)**
Total construction time: **7 months**

1.07 €/m² energy cost per year

Izodom elements:

MC 2/35 (U_0=0.15 W/m²K) Neopor (wall elements)
STP (U=0.27 W/m²K) EPS (floor)

Outside walls:
U=0.15 W/m²K

Made of the Izodom system:
- plaster rendering
- 150 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)

Basement floors to the ground:
U=0.13 W/m²K

- compacted gravel
- 250 mm reinforced concrete
- 250 mm heat insulation (EPS)
- 100 mm concrete screed
- floor finish

Roof[3]**:**
U=0.11 W/m²K

- roofing tiles
- 45 x 45 mm wooden battens
- truss system
- 250 + 50 mm heat insulation (mineral wool)

Windows: N/A
Main heat source: solid fuel stove with water collar
Cooling system: none
Ventilation: none
Tightness: N/A

Energy consumption per year[4]**:**
<20 kWh/m²
Energy cost per year[5]**:**
4.73 PLN/m² (1.07 €/m²)
Which means 60% savings on heating costs when compared to a standard building of this type[6]
Standard heating costs for the building from that time[7]**:** 11.84 PLN/m² (2.69 €/m²)

[1] Project www.studioatrium.pl/projekty-domow/S-GL-128-Vox,139.html [2] The value estimated on the basics of standard values for the products (exact numbers may vary). [3] The value estimated on the basics of standard values for the products (exact numbers may vary). [4] The estimate based on information provided by the client. [5] Costs for the entire building: PLN 540 per year (which is assumed based on the declaration from the client, usage 5-7 m³ burning wood). [6] Information verified for the same heat source. [7] According to: www.ag-dar.vaillant-partner.pl/kalkulatory-on-line/kalkulator-kosztow-ogrzewania-domu-i-podgrzewania-cieplej-wody-uzytkowej, available on 28.04.2016

POLAND
ZGORZELEC

What: **Single-family house**
Function: **Residential**
Where: **Zgorzelec, Poland**
Client: **Robert Gruszecki**
Architect: **Ready-made project**[1]
Execution: **self-built**
Area of the building: **185 m²**
Construction commencement: **March 2013**
Total construction time: **6 months**
(the construction of Izodom elements took around 60 days)
Habited since: **January 2014**
Approximate construction cost (installations excluded): **N/A**

1.00 €/m² energy cost per year

80% savings on hot water and heating bills

Izodom elements:

MC 2/35 (U_0=0.15 W/m²K)
EPS (wall elements)

STP (U_0=0.26-0.32 W/m²K)
EPS (floor)

DPL GLT/ZIG (U_0=0.15 W/m²K)
EPS (roof)

Outside walls:
U=0.15 W/m²K

Made of the Izodom system:
- 10 mm gypsum finish
- 50 mm thermal insulation (EPS)
- 150 mm reinforced concrete
- 150 mm thermal insulation (EPS)
- 20 mm external finish

Basement floors to the ground:
U=0.10 W/m²K

- 200 mm compacted gravel
- 3 x 100 mm thermal insulation (EPS)
- 250 mm reinforced concrete
- floor finish

Floor construction:
U=0.30 W/m²K

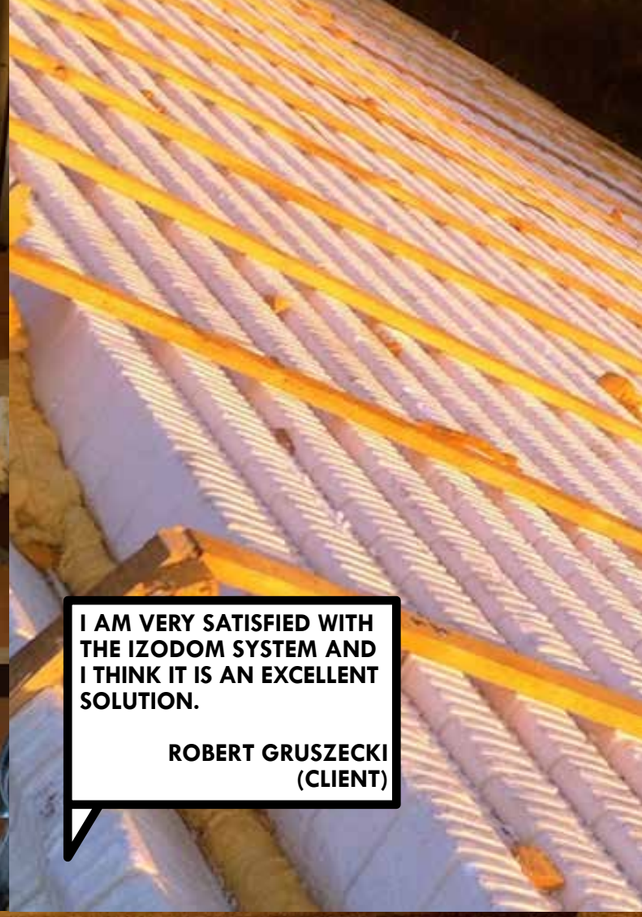
Made of the Izodom system:
- 25 mm gypsum board
- 50 mm floor in the Izodom system
(EPS and in-situ reinforced concrete beams)
- floor finish

Roof:
U=0.15 W/m²K

Made of the Izodom system:
- ceiling made out of gypsum board
- wooden roof truss
- thermal insulation (Izodom EPS elements)
- roofing tiles

Main heat source: solid fuel stove
Additional heat source: fireplace
Cooling system: no
Ventilation: system with recuperation

Energy consumption per year:[2]
<25 kWh/m²
Energy cost per year[3]**:**
4.32 PLN/m² (1.00 €/m²)
Which means 80% savings on heating costs when compared to a standard building of this type [4]
Standard heating costs for the building from that time[5]**:** 21.51 PLN/m² (5.01 €/m²)



I AM VERY SATISFIED WITH THE IZODOM SYSTEM AND I THINK IT IS AN EXCELLENT SOLUTION.

ROBERT GRUSZECKI (CLIENT)

[1] To be found at: www.horyzont.com/projekty/1088-sielanka-100-mdm-wersja-a-z-podwojnym-garazem.html#.VxdoOjB974Y [2] *The estimate made based on the data provided by the client.* [3] *Total heating costs: PLN 800. Approximate cost estimated by the client.* [4] *Information checked for the same heating source.* [5] *Information can be found at: www.ag-dar.vaillant-partner.pl/kalkulatory-on-line/kalkulator-kosztow-ogrzewania-domu-i-podgrzewania-cieplej-wody-uzytkowej, available on 07.04.2016.*

UNITED KINGDOM
LOCH LOMOND

What: **Single-family House**
Function: **Residential**
Where: **Loch Lomond, United Kingdom**
Client: **Mrs B Crook / Mr T Hesse**
Architect: **Econekt**
Execution: **Econekt**
Building area: **179 m²**
Construction commencement: **April 2014**
Habited since: **not habited yet**
Approximate construction costs (installations excluded): **£130.000 (EUR 165.083)**
Man-hours necessary to build 1m² of the building: **0.1 man-hour/m²**
Total construction time: **6 weeks (nearly 3 of which were spent on ground works)**

Izodom elements:

MC 2/35 (U_0=0.15 W/m²K)
Neopor (wall elements)

Outside walls:
U=0.15 W/m²K

Made of the Izodom system:
- 25 mm Siberian larch (on 25 x 50mm timber battens) or stone slips (depending on level)
- 150 mm polystyrene (Neopor)
- 150 mm in-situ cast concrete
- 50 mm polystyrene (Neopor)
- 12.5 mm plasterboard (on 47x19 mm battens at 600 mm centres)

Foundation and floor:
U=0.13 W/m²K

"SpanTherm" system:
- 22 mm V313 chipboard flooring (on battens)
- 100 mm concrete
- 175 mm insulation (SpanTherm Slab)
- 100 mm void under the slab
- polythene DPM
- min 150 mm well comacted sand

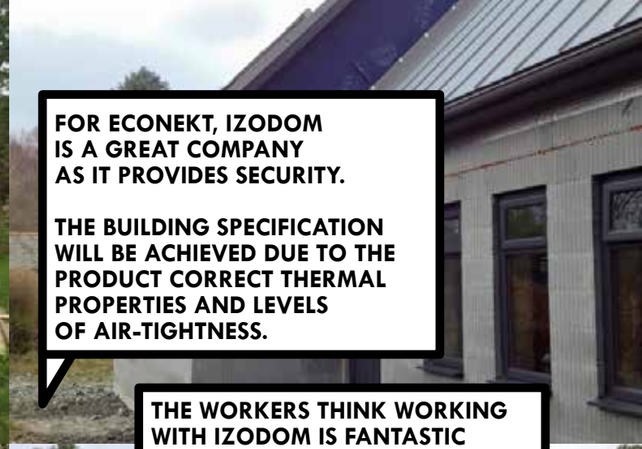
Roof:
U=0.09 W/m²K

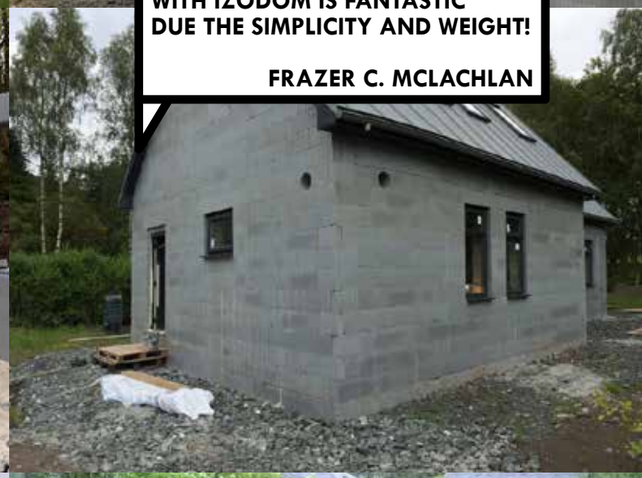
- zinc roof cladding (RHEINZINK Standing seam roofing in dark grey)
- vapour control layer (VLC)
- 22 mm sarking felt
- min 50 mm ventilated air space behind
- 120 mm rigid insulation between rafters
- 150 mm glass wool insulation
- 12.5 mm plasterboard (painted inside with gypsum top coat)

Windows: Low energy triple glazed UPVC windows
Main heat source: Log burner
Cooling system: None
Ventilation: Mechanical ventilation with heat recovery unit
Tightness:
Tightness of the building must not exceed 0.6 times/h with the difference of 50 Pa pressure between the inside and outside.

Energy consumption per year[1]**:**
<15 kWh/m²
Energy cost per year:
Unable to be estimated because of the uncommon heating source – log burner (no real data, as the building is not habited yet)

[1] *No actual data available; building constructed to passive house standards.*





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www.pasywnedomy.eu

GPS: N 51°35'37.75"
E 18°58'28.55"