ACTIVE HOUSE CONCEPT IN IVANO-FRANKIVSK PUBLIC BUILDING

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Lead beneficiary: Ivano-Frankivsk National Technical University of Oil and Gas
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The project was co-founded by the European Union

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19th Century

20th Century

21st Century

Image source: Albert, Righter and Tittmann Architects
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RECONSTRUCTION PROJECT OF THE OLD BUILDING
ENCLOSING STRUCTURES OF THE BUILDING

Outside walls

Bordered by outside air

- brickwork
- polystyrene foam insulation Ferozit 13 kg / m³

Bordered by other buildings

- brickwork
- polystyrene foam insulation Ferozit 13 kg / m³
ENCLOSING STRUCTURES OF THE BUILDING

Comparison of heat losses through the outer walls of two adjacent buildings
ENCLOSING STRUCTURES OF THE BUILDING

**Roof**
- 1,5 mm pvc membrane
- 15 mm OSB stove
- 30 mm ventilated air layer
- 1,5 mm air barrier
- 350 mm fiberglass insulation Isover Profi
- 1,5 mm vapor barrier membrane
- 250 mm air layer where the cooling system pipelines are located
- 9 mm drywall

**Floor**
- 200 mm concrete screed where the pipes of the heating system are located
- 250 mm polystyrene foam insulation Ferozit
- Soil with a contour of pipelines of cooling system

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ENCLOSING STRUCTURES OF THE BUILDING

Thermal bridges
ENCLOSING STRUCTURES OF THE BUILDING

Windows and doors

REHAU GENEO PHZ

ROTO Q LINE

ALUTEC

4i – 16Ar – 4 – 16Ar – 4i
4i – 8Ar – 4 – 8Ar – 4 – 8Ar – 4i
ENCLOSING STRUCTURES OF THE BUILDING

Windows
ENCLOSING STRUCTURES OF THE BUILDING

Thermal bridges, window placement

Classic

Window behind the wall
ENCLOSING STRUCTURES OF THE BUILDING

Thermal bridges, window placement

The difference between the maximum and minimum value of the surface temperature is below 5 °C. Conclusion - window thermal bridges are not so essential.
ENCLOSING STRUCTURES OF THE BUILDING

Thermal bridges

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ENCLOSING STRUCTURES OF THE BUILDING

Thermal bridges
ENCLOSING STRUCTURES OF THE BUILDING

Thermal bridges

Design without thermal bridges significantly improves the quality of structures. This increases the durability of structures and saves thermal energy for heating.

In the Passive House heat losses through the thermal bridges are also greatly reduced. As usual, they are so minor that you don't need to take them into account.
ENERGY CONSUMPTION

<table>
<thead>
<tr>
<th>Type of consumption</th>
<th>Estimated consumption for the year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>thousand kWh</td>
</tr>
<tr>
<td>Energy consumption of heating systems</td>
<td>3,5</td>
</tr>
<tr>
<td>Energy consumption of ventilation systems</td>
<td>2,4</td>
</tr>
<tr>
<td>Energy consumption of hot water supply systems</td>
<td>12,5</td>
</tr>
<tr>
<td>Energy consumption of cooling systems</td>
<td>0,2</td>
</tr>
<tr>
<td>Power consumption of lighting systems</td>
<td>11,8</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>30,4</td>
</tr>
</tbody>
</table>

Specific greenhuse gas emissions, kg/m² per year: 17.5

Specific consumption of primary energy, kWh/m² per year: 95.8
KNOW-HOW 1 - HEATED FLOOR AS A HEAT BUFFER

- 200 mm concrete screed where the pipes of the heating system are located
- 250 mm polystyrene foam insulation Ferozit
- Soil with a contour of pipelines of cooling system

= 48.4 m³ off heat buffer
KNOW-HOW - INTEGRATED HEATING AND COOLING SYSTEM

Under the roof level
- drywall
- air layer where the cooling system pipelines are located

Floor level of the third floor
- concrete screed where the pipes of the heating system are located

Floor level of the second floor
- concrete screed where the pipes of the heating system are located

Ground floor level
- concrete screed where the pipes of the heating system are located
KNOW-HOW 2 – GROUND WATER PIPE HEAT EXCHANGER FOR COOLING SYSTEM

Floor

- 200 mm concrete screed where the pipes of the heating system are located
- 250 mm polystyrene foam insulation Ferozit
- soil with a contour of pipelines of cooling system
KNOW-HOW 3 - HEATING SYSTEM WITH THE POSSIBILITY OF MODERNIZATION

GENERATION SYSTEM

- System with solar panels to power the heat pump
- Solid fuel boiler
- Electric boiler
- Storage tank

Energy distribution and transportation subsystem

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Thanks for your attention!