PROJECT SUMMARY
Renovation of a single-family house, built in the 1950ies, with vertical enhancement for a second housing unit and a new staircase. Complies with low energy requirement.

SPECIAL FEATURES
- components of a Passive House in the first floor
- central mechanic ventilation system with heat recovery
- air/air heat pump

ARCHITECT
Architect Dipl. Ing. FH Thomas Abendroth

OWNER
DI Karin und DI Dr. Reinhard Thayer
Private

SFH in Mautern AT

IEA – SHC Task 37
Advanced Housing Renovation with Solar & Conservation
This single family house in Mautern near Vienna was built in the fifties with a central gas heating system, a central preparation of domestic hot water by electricity and a typical building envelope with a space heat demand of 332 kWh/(m²a).

After the renovation in 2004 and addition of a storey in wooden framing, the whole building complies to low energy requirements. The space heating demand is 41 kWh/(m²a).

**OBJECTIVES OF THE RENOVATION**

- Double the living space
- Reduce heating costs to a minimum
- Use a high degree of pre-fabrication
- Comply with low energy requirements in the new storey
- Conservation of the garden area
- Renovation with least disturbance of neighbors
- Construct an economic building

**SUMMARY OF THE RENOVATION**

- Insulation: roof (400 mm), façade (300 mm) basement ceiling (180 mm)
- Triple glazed windows in the upper floor
- Enhancement of the ground floor
- Use of prefabricated wall units (first floor)
- New balconies for the first floor
- Addition of a staircase
- More glazing at the ground floor
- Mechanical ventilation system with heat recovery and air/air heat pump for the first floor
CONSTRUCTION

**Roof construction**  
U-value: 0.112 W/(m²·K)  
(interior to exterior)  
plasterboard 15 mm  
air space 36 mm  
OSB airtight 16 mm  
cellulose insulation 400 mm  
AGEPAN softboard 16 mm  
ventilation space 80 mm  
boards, roof covering metal 24 mm  
Total 587 mm

**Wall construction**  
U-value: 0.143 W/(m²·K)  
(interior to exterior)  
plasterboard 15 mm  
air space 36 mm  
OSB airtight 16 mm  
cellulose insulation 300 mm  
AGEPAN softboard 16 mm  
ventilation space 50 mm  
lathing 25 mm  
boarding 25 mm  
Total 483 mm

**Basement ceiling**  
U-value: 0.194 W/(m²·K)  
(top down)  
slab 30 mm  
floor screed 60 mm  
insulation polystyrene 180 mm  
concrete floor 160 mm  
Total 430 mm

Window section – south terrace

Window first floor:  
triple thermopane glazing  
$U_g$: 0.7 W/(m²·K)  
$U_w$: 1.0 W/(m²·K)

Removing existing roof

Prefabricated walls

Construction south terrace
**Summary of U-values W/(m²·K)**

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attic floor</td>
<td>1.3</td>
<td>0.11</td>
</tr>
<tr>
<td>Walls</td>
<td>1.5</td>
<td>0.14</td>
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<tr>
<td>Basement ceiling</td>
<td>0.9</td>
<td>0.19</td>
</tr>
<tr>
<td>Windows</td>
<td>ca. 1.4</td>
<td>1.00</td>
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</tbody>
</table>

**RENEWABLE ENERGY USE**

Opportunity for future installation of PV.

**ENERGY PERFORMANCE**

Space + water heating (primary energy)*

Before: 495.56 kWh/(m² a)

After: 186.43 kWh/(m² a)

Reduction: 62% (existing gas heating)

Future reduction: 83% (new geothermal heat pump)

*a according to OIB Richtlinie 6

**BUILDING SERVICES**

The building meets the local low energy requirement standard* by means of high insulation of the top floor, walls and floors, reductions of thermal bridges, glazing with Passive House quality windows in the first floor and an air tight envelope.

A new central ventilation system with heat recovery (efficiency 85%) and air/air heat pump is installed in the new storey. The preheating of the cold air is done with a ground-air heat exchanger. The new floor heating in the upper floor and the radiators in the ground floor are supplied by the central gas heating, which also heats the domestic hot water.

**INFORMATION SOURCES**

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PROJECTS in AUSTRIA

PROJECT SUMMARY

P1 Apartment building in Kierling
P2 5 story apartment house in Linz
P3 Enhancement house Wimmer in St. Valentin
P4 Single-family house in Pettenbach
P5 Old people’s home in Landeck
P6 Housing in Purkersdorf
P7 Historic building in Irdning
P8 Enhancement in Mautern
P9 Attic conversion in Innsbruck
P10 House Schilchegger in St. Martin
P11 Single-family house Kraiger in Kufstein
P12 Apartment buildings in Dornbirn

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