Housing in Purkersdorf / Austria

PROJECT SUMMARY
Renovation of a 19th century villa with four flats and construction of 10 passive-house units

SPECIAL FEATURES
60 m² solar collectors on the roof and 60 m² photovoltaic panels

ARCHITECT
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IEA – SHC Task 37
Advanced Housing Renovation with Solar & Conservation
BACKGROUND

The massive exterior walls of this three storey 19th century villa were not insulated and still contained the original windows. The space heating was supplied by decentralized wood fired tiled stoves. The domestic hot water was prepared decentralized by electricity.

SUMMARY OF THE RENOVATION

- insulation of facades, roof and cellar
- passive house suitable windows / renovation of windows
- construction of loggia
- mechanical ventilation with heat recovery and air heating
- solar collectors for domestic hot water preparation
- four flats
- biomass heating station
### CONSTRUCTION

#### Roof construction
(Interior to exterior)
- Cross-laminated timber board – planed: 110 mm
- Moisture barrier: 5 mm
- Polystyrene: 300 mm
- Vapour pressure equalisation layer: 5 mm
- Water-proofing – two-layer: 10 mm
- Separating layer: 5 mm
- Vegetative substrate, filtering fleece, drainage: 100 mm
- Total: 535 mm

#### Wall construction
(Interior to exterior)
- Gypsum plasterboard: 15 mm
- Cross-laminated timber board: 100 mm
- Mineral wool in wooden grid – two-layer: 300 mm
- Wind-proofing
- Lath-wood: 30 mm
- Larch boarding: 20 mm
- Total: 466 mm

#### Basement floor
(Top down)
- Parquet: 15 mm
- Cement screed: 70 mm
- Polystyrene: 240 mm
- Plaster floor: 30 mm
- Water-proofing: 5 mm
- Waterproof concrete basement slab: 250 mm
- Filter layer: 50 mm
- Antifreeze rubble: 150 mm
- Total: 810 mm
### RENEWABLE ENERGY USE

The 60 m² solar collectors on the south-oriented roof of the existing building achieve an annual solar fraction of the solar heating system of 27.7% (for domestic hot water and space heating).

### BUILDING SERVICES

A new centralised ventilation system with heat recovery (efficiency 85%) will be installed.

Domestic hot water will be heated by solar collectors and biomass instead of decentral electric boilers in each apartment.

### INFORMATION SOURCES

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### Summary of U-values W/(m²·K)

<table>
<thead>
<tr>
<th></th>
<th>New objects</th>
<th>Renovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof construction</td>
<td>0.10</td>
<td>0.11</td>
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<tr>
<td>Walls</td>
<td>0.16/0.10</td>
<td>0.13</td>
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<tr>
<td>Basement ceiling</td>
<td>0.15</td>
<td>0.25</td>
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<tr>
<td>Windows</td>
<td>0.75/0.85</td>
<td>0.90</td>
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