

Housing in Purkersdorf - AT

PROJECT SUMMARY

Renovation of a 19th century villa with four flats and new construction of ten Passive House buildings on the site.

SPECIAL FEATURES

- ventilation system with heat recovery in each apartment
- 60 m² solar panels for DHW and space heating
- reconstruction of the original façade

ARCHITECT

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OWNER

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Jungarbeiterbewegung
Co-operative



IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation

Before



After

BACKGROUND

The massive exterior walls of this three-storey 19th century villa were not insulated, with the original windows still in place. The space heating was supplied by decentral located wood fired tiled stoves. The domestic hot water was prepared decentrally by electricity and the building had a space heating demand of 180 kWh/(m²a). After the renovation 2009 the building almost complies with Passive House standards and achieves 15 kWh/(m²a) space heat demand. The building activity was sponsored by the federal state of Lower Austria.

OBJECTIVES OF THE RENOVATION


- reduction of the heating costs to a minimum
- ecological renovation with renewable resources
- optimized building performance
- to comply with low energy requirements
- conservation of the outward appearance of the villa

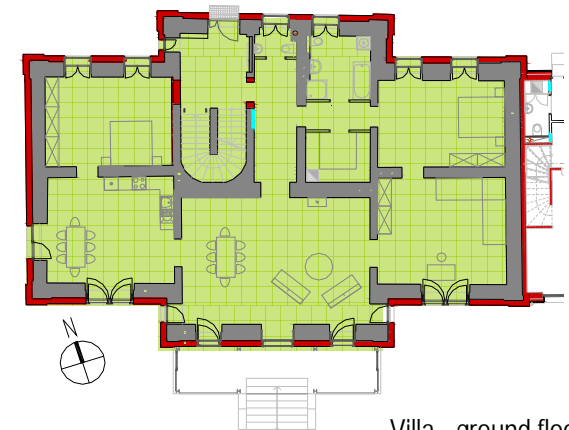
SUMMARY OF THE RENOVATION

- Insulation of the building envelope: roof (300 mm), façade (260 mm) basement ceiling (130 mm)
- renovation of the old windows to windows meeting Passive House standards
- reconstruction of roof and loggia
- construction of four flats
- decentral ventilation system with heat recovery in each apartment
- solar panels, solar combisystem
- biomass heating plant
- new electrical and sanitary installations



Section

 Renovation
 Lasting quality



Villa - ground floor



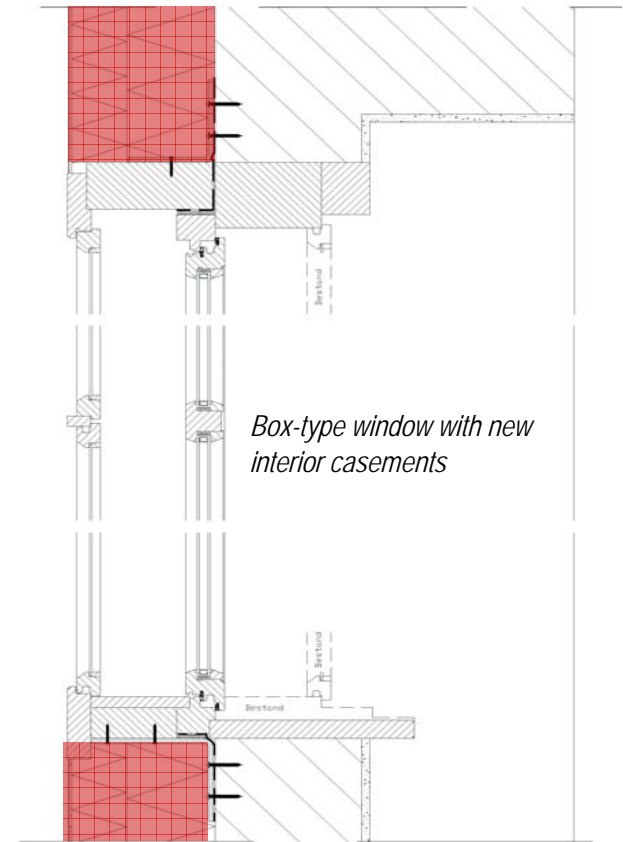
Detached house - section

CONSTRUCTION

Roof construction	<i>U-value: 0.113 W/(m²·K)</i>
(interior to exterior)	
laminated wood	146 mm
mineral wool insulation	300 mm
hard board	10 mm
air space	50 mm
lathing	30 mm
<u>fibrated cement board</u>	<u>10 mm</u>
Total	546 mm

Wall construction	<i>U-value: 0.121 W/(m²·K)</i>
(interior to exterior)	
lime plaster	30 mm
solid brick	600 mm
expanded polystyrene	260 mm
<u>plaster</u>	<u>15 mm</u>
Total	905 mm

Basement ceiling	<i>U-value: 0.251 W/(m²·K)</i>
(top down)	
parquet	15 mm
counter floor	20 mm
mineral wool insulation	50 mm
concrete	50 mm
brick (existing)	100 mm
<u>stone wool insulation</u>	<u>80 mm</u>
Total	315 mm



Window renovation – vertical section



Photo: Architekturburo Reinberg

Gable moulding



Photo: Architekturburo Reinberg

New applied cornice on the insulation

FAÇADE DECORATION

The lasting quality mansion gains a volume enlargement by adding a 26 cm thick insulation to the exterior walls. To preserve the proportions the roof was lifted. To the same extent the façade decorations along the edges of the buildings and along the roof were increased. However, the decorations around the windows cannot be changed because the windows of the lasting quality do not change their size and shape. As the façade decorations are a striking characteristic of the existing building, it was of high interest to reattach the decorations to the façade onto the insulation to preserve the appearance and the historic value (significance) of the building.

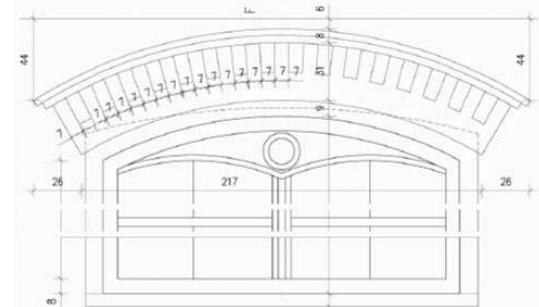


Photo: Architekturburo Reinberg

Roofing of arched window



Photo: Rupert Steiner

Attic floor

Summary of U-values $W/(m^2 \cdot K)$

	New objects	Renovation
Roof construction	0.8	0.11
Walls	1.0	0.12
Basement ceiling	0.5	0.25
Windows	ca. 2.5	1.04

BUILDING SERVICES

The building will meet the requirements of a Passive House by means of reinforced insulation of the top floor, walls and cellar ceiling, reductions of thermal bridges and the renovation of the old box-type windows by changing the interior casements to Passive House standard windows.

A ventilation system with heat recovery (efficiency 85%) in each flat is installed. The remaining space heat demand is covered by a central biomass heating and the heat is released with low temperature heat distribution system. Domestic hot water is heated by solar panels and the remaining heat demand is provided by central biomass heating.

RENEWABLE ENERGY USE

The 60 m² solar panels on the south facing roof of the existing building achieve an annual solar fraction of the solar heating system of 27.7% (for DHW and space heating)

ENERGY PERFORMANCE

Space + water heating (primary energy)*
 Before: 419 kWh/(m²a)
 After: 15.8 kWh/(m²a)
 Reduction: 96 %

* according to OIB Richtlinie 6

INFORMATION SOURCES

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Photo: Architekturbüro Reinberg

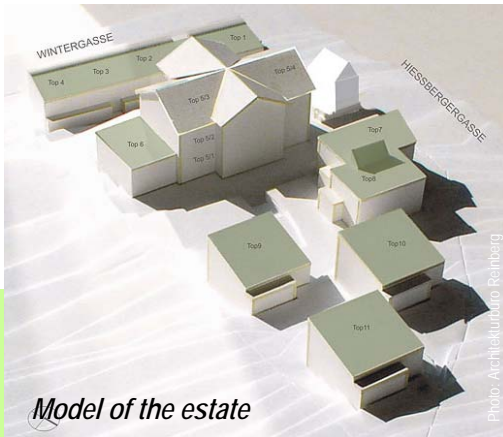


Photo: Architekturbüro Reinberg

Model of the estate

