Enhancement house in St. Valentin - AT

PROJECT SUMMARY
Renovation of a single-family house built in 1982 with vertical enhancement for a second housing unit and an annex for a staircase.

SPECIAL FEATURES
- components of a Passive House in the first floor
- ventilation system with heat recovery and air heating

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Private

IEA – SHC Task 37
Advanced Housing Renovation with Solar & Conservation
BACKGROUND
The residential building, a single family bungalow in St. Valentin near Linz, was built in the 1980s with a coke boiler, later on with an oil driven floor heating system, a central supply of hot water by electricity and a typical building envelope with a space heating demand of 198 kWh/(m²a). The fabric of the building was in a good condition but with very few insulation.
After renovation 2006 with an intensive engagement of the owner, a new storey built with wooden framework walls, almost complies with Passive House standard and the ground floor is up to the mark of low energy requirements. The whole building achieves 30 kWh/(m²a) space heating demand.

OBJECTIVES OF THE RENOVATION
- doubling of the living space
- reduction of the heating costs to a minimum
- high degree of pre-fabrication
- to meet low energy requirements in the ground floor
- to comply with Passive House standard in the new storey
- renovation with a least distribution of residents
- to construct an economic building

SUMMARY OF THE RENOVATION
- Insulation of the building envelope: roof (456 mm), façade (300 mm) basement ceiling (120 mm)
- one new window in the ground floor
- windows meeting Passive House standard in the upper floor
- enhancement of the ground floor
- utilization of prefabricated wall units (first floor)
- addition of a staircase
- new sanitary installations
- ventilation system with heat recovery and air/air heat pump in the first floor
- central vacuum cleaner system
CONSTRUCTION

Roof construction  \( U\text{-value: } 0.089 \text{ W/(m}^2\text{·K)} \)
(interior to exterior)
- plasterboard  15 mm
- roof board    24 mm
- OSB airtight  18 mm
- cellulose insulation  456 mm
- softboard    16 mm
- air space    60 mm
- boarding     24 mm
- roof foil    2 mm
Total  615 mm

Wall construction  \( U\text{-value: } 0.109 \text{ W/(m}^2\text{·K)} \)
(interior to exterior)
- plasterboard  15 mm
- OSB airtight  11 mm
- insulation   100 mm
- OSB airtight  18 mm
- cellulose insulation  300 mm
- softboard    16 mm
- air space    50 mm
- façade panel 10 mm
Total  520 mm

Basement ceiling  \( U\text{-value: } 0.211 \text{ W/(m}^2\text{·K)} \)
(top down)
- floor construction (existing)  121 mm
- brick                    250 mm
- insulation   120 mm
- plaster      2 mm
Total  493 mm

Wrecking the roof
Prefabricated walls
Insulation and façade lining

Lifting sliding door: triple thermopane glazing
\( U_g: 0.60 \text{ W/(m}^2\text{·K)} \)
\( U_w: 0.86 \text{ W/(m}^2\text{·K)} \)

Window section
RENEWABLE ENERGY USE
The residents are planning to create an energy self-sufficient building. The first step will be the change from oil heating to an air/air heat pump, followed by windmills and PV for providing electricity.

ENERGY PERFORMANCE
Space + water heating (primary energy)*
Before: 317 kWh/(m² a)
After: 66.7 kWh/(m² a)
Reduction: 79% (existing oil heating)
Future reduction: 93% (new pellets heating)

*according to OIB Richtlinie 6

INFORMATION SOURCES
JORDAN (architektur & energie)
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