PROJECT SUMMARY
Comprehensive renovation of building, not renovated since built in 1962, including: energy, sound acoustics, kitchens+baths and balconies.

SPECIAL FEATURES
Swiss Minergie-P Standard (stricter than “Passive House”)

ARCHITECT
BARBOS, CH-6370 Stans

OWNER
Gabriela Rohrer & Leo Odermatt

Two-family house in Schürmatt, Stansstad CH

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

Building never renovated since built in 1962, tenants had moved out so vacant. Owners decided to bring the house to highest energy standard, use renewable energy, improve daylighting and better acoustically isolate the apartments.

SUMMARY OF THE RENOVATION

- Thermal breaks eliminated, i.e. new balconies supported on posts.
- Wall openings for windows on SE and SW facades increased to admit more light
- Walls including basement insulated on exterior
- Attic floor and basement ceiling insulated
- Apartment acoustically isolated
- Oil heating replaced by wood pellet furnace and new heat distribution piping
- Solar collectors added
CONSTRUCTION

**Roof floor construction**  \( U\text{-value: 0.11 \text{W/(m}^2\text{K)}} \)
- Wooden floor 20 mm
- Mineral wool insulation (Flumroc Para) 240 mm
- Weather barrier (Tyvek) \( x \) mm
- Wooden spacers 25 mm
- Wooden beams 200 mm
- Plaster ceiling 15 mm
- Total 500 mm

**Wall construction**  \( U\text{-value: 0.11 \text{W/(m}^2\text{K)}} \)
- (interior to exterior)
  - Wooden interior panelling 15 mm
  - Wooden framing 140 mm
  - Wooden sheathing + Perfektaplatte 50 mm
  - Existing exterior stucco 15 mm
  - Plywood (3-layer) 27 mm
  - Mineral wool (Flumroc Compact) 280 mm
  - Mineral Stucco 10 mm
  - Total 537 mm

**Basement ceiling**  \( U\text{-value: 0.15 \text{W/(m}^2\text{K)}} \)
- (top down)
  - Wooden parkett 10 mm
  - Cement leveling mortar bed 45 mm
  - Shredded cork separating layer 10 mm
  - Concrete slab 150 mm
  - Styropor insulation + plaster 30 mm
  - Styropor Hi-Compact + plaster 125 mm
  - Total 370 mm
Acoustical insulation:
New suspended ceiling with acoustical insulaton
New sound deading floor

Wall openings
Enlarged with new structural reinforcing to accomodate larger windows to the south-east and south-west.

Window thermal properties (W/m²K):
- $U_{\text{glass}}$ 0.50
- $g$ 0.48
- $U_{\text{window}}$ 0.77

Sirus Multifunction Window System
BACKGROUND

Building never renovated since built in 1962, tenants had moved out so vacant. Owners decided to bring the house to highest insulation standard, use renewable energy, better isolate apts. acoustically and improve apt. layouts.

Balconies

Original balconies cut off, new, free-standing balconies erected to eliminate thermal bridges.

Balcony floors are glass to allow more daylight to enter the living spaces.
Ventilation / air tightnesss

Mechanical ventilation with heat exchanger in attic. 
50 W power by 150 m³/h and 50 Pa  
(Hoval Homeven RS 250)

Air supply and return via ducts in corridors and in roof, where ducts wrapped with 50 mm insulation.

Building envelope tightened against air leakage to achieve $n_{50} = 1.0$
Summary of U-values W/(m²·K)

<table>
<thead>
<tr>
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<th>Before</th>
<th>After</th>
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<tr>
<td>Attic floor</td>
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<tr>
<td>Walls</td>
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<td>Basement ceiling</td>
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<td>Windows U_{total}</td>
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BUILDING SERVICES
- Central ventilation system with heat recovery
- Central wood pellet stove (8 kW)
  (pellets in space of former oil tanks)

RENEWABLE ENERGY USE
- 8 m² roof-integrated solar collectors coupled
- 750 l storage tank

ENERGY PERFORMANCE
Space + water heating (primary energy)*
Before: 160 kWh/m²
After: 20 kWh/m²
Reduction: 88%