PROJECT SUMMARY
Two similar buildings with different ventilation systems:
1st: Mechanical ventilation with heat recovery – 60 kWh/m²a heat demand
2nd: Exhaust air ventilation – 65 kWh/m²a heat demand

SPECIAL FEATURES
Solar collector, reduction of primary energy: 87 % (calculation)

ARCHITECT
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HVAC ENGINEER
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ENERGY CONCEPT
Stahl+Weiß, Büro für Sonnenenergie

OWNER
Freiburger Stadtbau GmbH

Apartment Building Rislerstrasse, Freiburg

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

Both apartment buildings were built in 1961 and are typical examples of similar housing projects of the 50s and 60s. Renovation was needed because the buildings’ floor plans, heating systems and thermal properties were timeworn and obsolete. The owner Freiburger Stadtbau has many similar buildings and plans to use this renovation as an example for future renovation projects.

SUMMARY OF THE RENOVATION

- Insulation of the façade (180 mm), the attic floor (260 mm) and the basement ceiling (200 mm)
- New windows (double glazing)
- Central heating system
- Possible connection to district heating system (future)
- Solar supported domestic hot water
- Enlarged balconies
- Expandability of kitchen and bath in case of new occupants
CONSTRUCTION

**Floor construction**  \(U\text{-value}: 0.14 \text{ W/(m}^2\text{K)}\)
(top down)
- Mineral wool insulation 260 mm
- Screed (existing) 50 mm
- Reinforced concrete slab (existing) 200 mm
- Total 510 mm

**Wall construction**  \(U\text{-value}: 0.15 \text{ W/(m}^2\text{K)}\)
(interior to exterior)
- Interior plaster (existing) 20 mm
- Clay brick (existing) 300 mm
- Exterior plaster (existing) 20 mm
- Mineral wool insulation 180 mm
- Exterior plaster 20 mm
- Total 540 mm

**Basement ceiling**  \(U\text{-value}: 0.17 \text{ W/(m}^2\text{K)}\)
(top down)
- Screed (existing) 5 mm
- Reinforced concrete slab (existing) 200 mm
- Mineral wool insulation 200 mm
- Total 450 mm
Summary of U-values W/(m²·K)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
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</thead>
<tbody>
<tr>
<td>Attic floor</td>
<td>1.54</td>
<td>0.14</td>
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<tr>
<td>Walls</td>
<td>1.32</td>
<td>0.15</td>
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<tr>
<td>Basement ceiling</td>
<td>1.50</td>
<td>0.17</td>
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<tr>
<td>Windows*</td>
<td>~2.10</td>
<td>0.80</td>
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BUILDING SERVICES

The existing single stoves in the buildings’ apartments were replaced by central heating systems in the attics. Condensing boilers with 60kW are used for heating and hot water. In one building the ventilation system is combined with heat recovery. The second building has only a simple exhaust ventilation system with defined openings in the façades and windows. The heating systems in both buildings are supported by solar collectors and connection to a future district heating system is planned.

RENEWABLE ENERGY USE

Each building has a solar collector, 24m² and 29m² respectively, installed on its roof and a 750 litre hot water storage tank.