

Apartment Building in Staufen, CH

PROJECT SUMMARY

Housing renovation in two stages
1st stage: building envelope
2nd stage: building services
Reduction of primary energy: 65%

SPECIAL FEATURES

110 m² PV installation on the roof

ARCHITECT

Architecture office Setz
www.setz-haus.ch

OWNER

Guido Erni, Immobilien ESTAG AG



IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation

Before



After

BACKGROUND

This apartment building from 1967 suffered from mildew and thermal bridges. The owner, Guido Erni, wanted to solve this through a systematic renovation. His main objectives were:

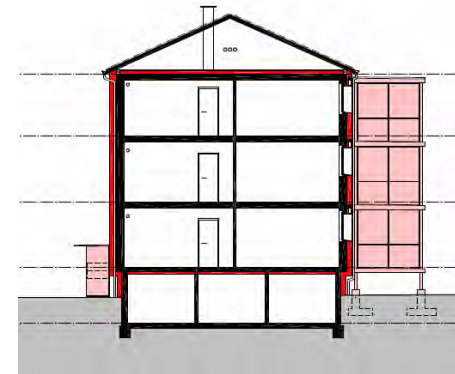
1. A sustainable, energy efficient building
2. Improved comfort in the apartments
3. Retirement income from the photovoltaic roof

SUMMARY OF THE RENOVATION

- Insulation of the building envelope:
 - attic floor (140 mm), facade (200 mm)
 - basement ceiling (100 mm)
- New roof cladding
- Enlarged balconies (from 5.9 m² to 12.6 m²)
- New entrance
- New ventilation system (HRC 85 – 90%)
- Heat pump as replacement of the oil heating
- Renovation of bathrooms and kitchens

1st stage (2005)

2nd stage (2007)



Section



Ground floor



New entrance roof without heat bridges

CONSTRUCTION

Floor construction *U-value: 0.15 W/(m²·K)* (top down)

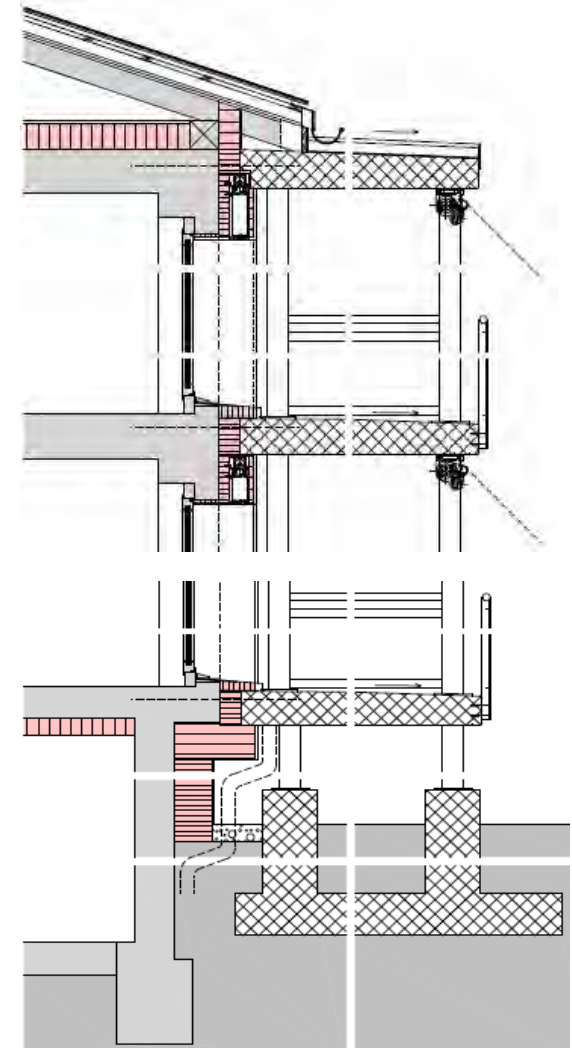
Floor elements with mineral wool	156 mm
Wooden panels (existing)	20 mm
Expanded polystyrene EPS (existing)	80 mm
Reinforced concrete (existing)	140 mm
Expanded polystyrene EPS (existing)	20 mm
Interior plaster (existing)	10 mm
Total	426 mm

Wall construction *U-value: 0.17 W/(m²·K)* (interior to exterior)

Interior plaster (existing)	10 mm
Modular clay tile brick (existing)	125 mm
Cork panels (existing)	3 mm
Modular clay tile brick (existing)	125 mm
Mineral wool insulation	200 mm
Exterior stucco	10 mm
Total	473 mm

Basement ceiling *U-value: 0.20 W/(m²·K)* (top down)

Cement mortar (existing)	40 mm
Reinforced concrete (existing)	140 mm
Polyphenolharz-rigid foam panels	100 mm
Total	280 mm



South façade with new, self-supporting balconies



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

	Before	After
Attic floor	0.32	0.15
Walls	1.32	0.17
Basement ceiling	2.27	0.20
Windows*	1.62	1.62

* including frame (replaced already 1994)

BUILDING SERVICES

During phase II (in 2007) the existing oil heating (28.6 kW) will be replaced by an air-water-heat pump (12 kW) with a COP of 3. Domestic hot water will be heated in a central boiler instead of in decentral electric boilers in each apartment. A new centralised ventilation system with heat recovery (efficiency 85-90%) with a cross-flow heat exchanger will be installed. The necessary penetrations of the façade were completed during phase I of the renovation. The ventilation system electric requirement amounts to 4.68 kWh/m²a.

RENEWABLE ENERGY USE

The 110 m² PV installation on the south-facing roof has a nominal output of 14.7 kWp and produced 14'300 kWh electricity in 2006. The electric power is fed into the utility grid. The PV installation will be amortised within 20 years.

ENERGY PERFORMANCE

Space + water heating (primary energy)*

Before: 154 kWh/m²

After: 54 kWh/m²

Reduction: 65%

*Swiss Standard: SIA 380/1: 2001

INFORMATION SOURCES

Enz, D., March 2007, *Bauerneuerung für die Zukunft*, Flumroc AG, Postfach, CH-8890 Flums, 36 pages (German, French, Italian)

www.flumroc.ch

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