

Apartment Building Roter Block, Freiburg

PROJECT SUMMARY

Building ensemble under historical preservation protection. Insulation for attic and façade only at inner courtyard. Redesign of floor plans with new kitchens and bathrooms. CO₂-reduction by the use of biomass for the central heating system.

SPECIAL FEATURES

CHP and boiler based on biomass (rap seed methyl ester)

ARCHITECT

Huller, Banzhaf + Partner

ENERGY CONCEPT

Stahl + Weiß, Büro für Sonnenenergie

OWNER

Freiburger Stadtbau GmbH



IEA SHC Task 37

Advanced Housing Renovation with Solar & Conservation

Before



After

BACKGROUND

“Roter Block” is part of a building ensemble in Freiburg along a public place, which was built in 1929. Next to major war destruction it was rebuilt in 1950 and put under preservation protection in 1975. In the course of the renovation the main objectives were:

- Preservation of the facades facing a public space.
- Redesign of floor plans with bigger bathrooms and kitchens.
- Improving the thermal properties of the building envelope where possible.
- Reduction of the primary energy demand and the CO₂-emissions by use of biomass for the building supply.

SUMMARY OF THE RENOVATION

- Redesign of floor plans
- Integration of loggias in new floor plans
- New balconies
- Insulation of the façade at the courtyard (120 mm) and new roof construction (240 mm)
- Central heating system with CHP, peak load boilers and water storage
- exhaust ventilation system



Site plan



Ground floor



CONSTRUCTION

Roof construction *U-value: 0.18 W/(m²·K)*

(top down)

Roof tiles	
Battens and counterbattens	48 mm
Roof sealing layer (vapour permeable)	
Mineral wool insulation	260 mm
Vapour barrier	
Battens	30 mm
Plasterboard	12 mm
Total	~ 350 mm

Wall construction *U-value: 0.23 W/(m²·K)*

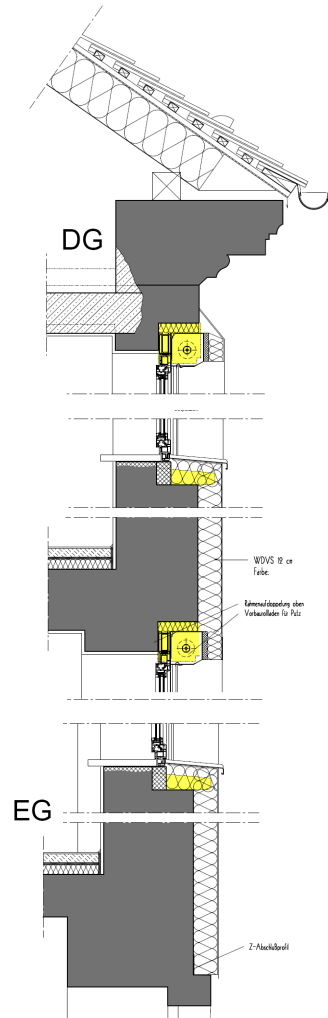
(interior to exterior)

Interior Plaster (existing)	30 mm
Clay brick (existing)	480 mm
Exterior plaster (existing)	40 mm
Mineral wool insulation	120 mm
Exterior plaster	30 mm
Total	800 mm

Basement ceiling *U-value: 0.41 W/(m²·K)*

(top down)

PVC flooring	5 mm
Screed	30 mm
Insulation (Polystyrene)	50 mm
Reinforced concrete slab (existing)	210 mm
Reed mat and plaster	25 mm
Total	~320 mm



Façade section



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

	Before	After
Roof		0.18
Walls (protected)		1.18
Walls (insulated)	1.18	0.24
Windows (protected)		2.50
Windows (new)	2.50	1.30
Basement ceiling		0.41

BUILDING SERVICES

Heating is supplied by two CHP units (25 kWel/ 38 kWth), combined with a peak load boiler (400 kW) and a water storage of 2000 litres. Due to the use of biomass (rape seed methyl ester) and primary energy credits for the generated electricity, the primary energy demand for the building can be reduced by 95% according to calculations.

RENEWABLE ENERGY USE

Biomass (rapeseed methyl ester) for boilers and CHP units.

ENERGY PERFORMANCE (PLANNING)

Primary energy demand
 Standard renovation: 104 kWh/m²
 Biomass concept: 6 kWh/m²
 Reduction: 95 %

SOURCE OF INFORMATION

Freiburger Stadtbau GmbH

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