

Apartment Building with shops in Zurich

PROJECT SUMMARY

Renovation of an apartment building
built in 1898
Historic preservation
Factor 4 energy reduction

SPECIAL FEATURES

Prefabricated roof modules

ARCHITECT

Architecture Office Viridén
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OWNER

Peter Frey



IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation



Before



After

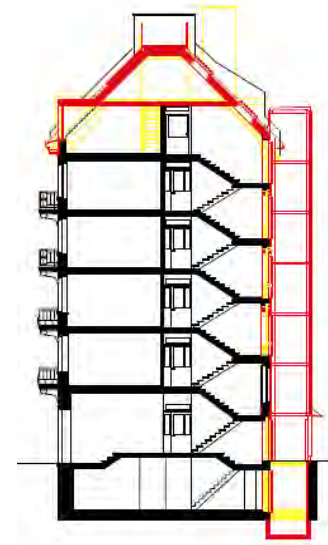
BACKGROUND

This apartment building, constructed in 1898, was in poor condition when the owner inherited it. He wanted to renovate the units to a high living standard, drastically reduce energy consumption and preserve the historic urban character of the structure.

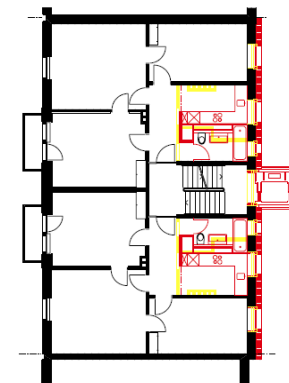
SUMMARY OF THE RENOVATION

- Roof replaced with eight prefabricated modules (240 mm insulation) installed by crane in a single day.
- Two new penthouse maisonettes created.
- Insulation of the rear façade (240 mm) and basement ceiling (200 mm).
- New windows.
(U-value: $1.2 \text{ W/m}^2 \text{ K}$, g-value: 0.56)
- Elevator tower added to rear
- Ceiling with stucco ornamentation preserved, wall paneling and doors restored.
- New bathroom and kitchen layouts
- New central mech. ventilation system (Heat recovery of 85 - 90%).
- Wooden pellet furnace (32 kW) as replacement of the gas heating (45 kW) with backup oil tank.
- Solar system with 28 m^2 solar flat plate collectors combi-tank (4000l).

Section



Floor plan





The street façade could not be changed

CONSTRUCTION

Roof construction *U-value: 0.15 W/(m²·K)*

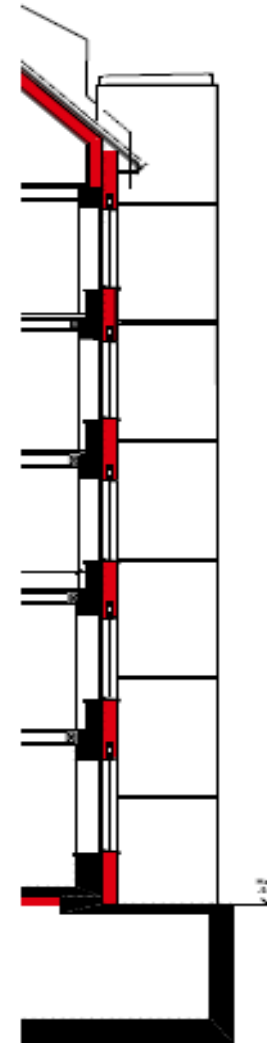
(from top to bottom)	
Roof tiles	66 mm
Wooden strapping	
	24 mm
Air gap, wooden cross strapping	50 mm
Weatherproofing paper	
OSB-panels	20 mm
Cellulose insulation	240 mm
Fermacel panels	12 mm
Total	412 mm

Rear façade *U-value: 0.13 W/(m²·K)*

(interior to exterior)	
Interior plaster (existing)	10 mm
Brick (existing)	390 – 450 mm
Exterior stucco (existing)	20 mm
Mineral wool insulation	240 mm
Mineral plaster	10 mm
Total	670 – 730 mm

Basement ceiling *U-value: 0.16 W/(m²·K)*

(top down)	
Ceramic panels (existing)	10 mm
Cement mortar (existing)	10 mm
Reinforced concrete (existing)	200 mm
Mineral wool insulation	200 mm
<u>Net support</u>	<u>10 mm</u>
Total	430 mm



Rear façade with ext. insulation and new elevator tower



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

	Before	After
Attic floor	ca. 1.7	0.15
Rear façade	1.06	0.13
Basement ceiling	2.64	0.16
Windows*	ca. 2.6	1.20

* including frame

BUILDING SERVICES

The existing gas heating (45 kW) with oil backup and tank was replaced by a wooden pellet furnace (32 kW).

A new centralised ventilation system with heat recovery (efficiency 85 – 90%) and a cross-flow heat exchanger were installed. The ventilation system has a fan with 410 W connected power.

RENEWABLE ENERGY USE

28 m² solar flat plate collectors on the roof (combi-system) deliver hot water to a 4000 litre central boiler tank. The solar coverage is 100% in summer.

ENERGY PERFORMANCE

Space + water heating (primary energy)*

Before: ca. 160.0 kWh/m²

After: 39.5 kWh/m²

Reduction: 75%

*Swiss Standard: SIA 380/1: 2001

INFORMATION SOURCES

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

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