

Nursing home for elderly in Stuttgart DE

PROJECT SUMMARY

Overall renovation of building envelope and technical services.
65% reduction of primary energy.

SPECIAL FEATURES

Solar air collectors
Lighting control
Gas boiler and thermal power station
Single room heating control

ARCHITECT

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OWNER

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IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation



Before



After



BACKGROUND

The seven story main building of this retirement home, dating from 1965, originally had 116 beds. It also incorporates a nursery-school. In 1974 a building was added as a nursing home with another 55 beds. In addition to retrofitting the main building new offices, a dining room and an entrance foyer on the ground floor were added. The functioning of the main building as a nursing home was limiting. This problem was addressed by the renovation.

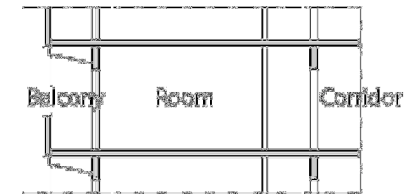
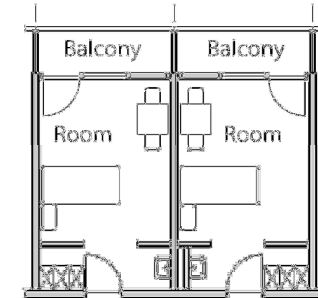
A disadvantage of the main building layout was that the rooms were separated by long corridors into three zones with a small, somewhat dark common area squeezed between the elevators and stairwell.

The project was sponsored by the German Federal Ministry of Economy and Technology.

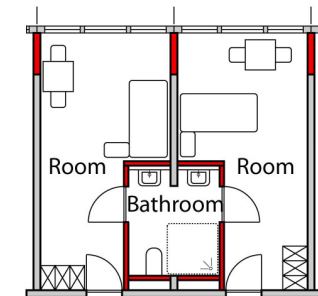
SUMMARY OF THE RENOVATION

- Rooms were enlarged by closing in the balconies with a light wooden construction with 20 cm of mineral wool. All windows were replaced. To ensure good daylighting of the rooms and common areas, 2/3 of the surface area is transparent and 1/3 opaque. 50 m² solar air collectors were also incorporated into both the east and west facades.
- Insulation: north and south facades, 20 cm polystyrene; roof 22 cm polyurethane.
- Single room heating control.
- A thermal power station (100 kW heating capacity + 50 kW electric power) is the heart of the system. There are also two low-temperature gas burners (310 kW) with exhaust gas heat exchangers.

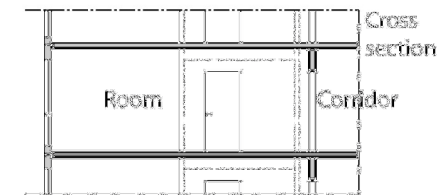
Before retrofitting



After retrofitting



Floor plan



Cross section



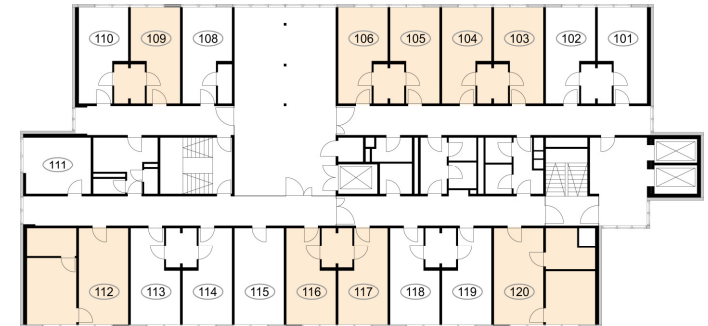
Connection details: New facade

CONSTRUCTION

Roof construction	<i>U-value: 0.13 W/(m²·K)</i>
Concrete	160 mm
Heavy concrete	30 mm
Insulation	220 mm
Paving stone (with insulation)	50 mm
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Total	460 mm

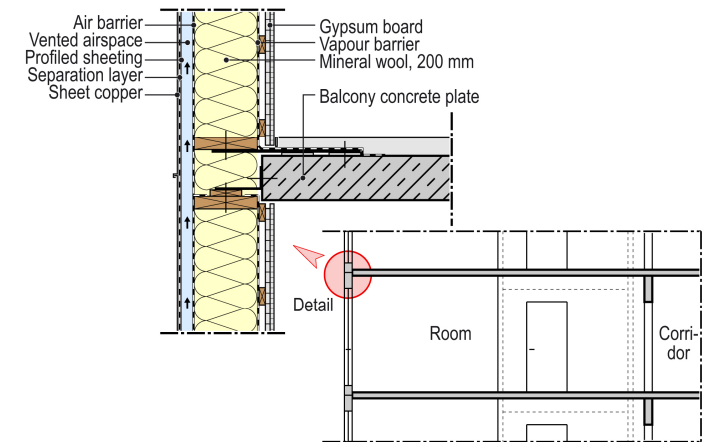
Wall construction (N / S)	<i>U-value: 0.16 W/(m²·K)</i>
(interior to exterior)	
Gypsum plaster	20 mm
Brickwork	160 mm
Insulation	30 mm
Concrete	65 mm
Cement sheets	25 mm
Polystyrene ext. insulation	200 mm
Exterior plaster	20 mm
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Total	520 mm

Wall construction (W / E)	<i>U-value: 0.19 W/(m²·K)</i>
(Interior to exterior)	
Gypsum board	12.5 mm
Insulation	200 mm
Wooden casing	20 mm
Copper sheet	1 mm
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Total	232.6 mm



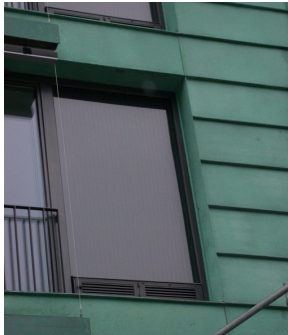
Floor

Facade / ceiling connection details



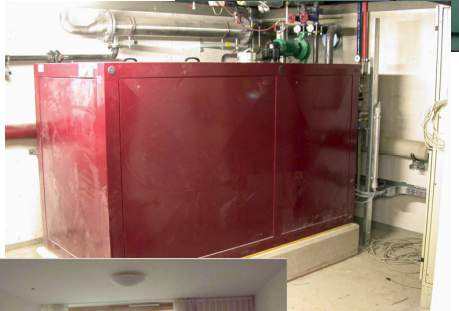
Cross section

Connection details: New facade to balcony



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

	Before	After
Roof	0.7	0.13
Walls (N / S)	1.4	0.16
Walls (W / E)	0.7	0.19
Windows*	2.5	0.80



BUILDING SERVICES

The main heat supply is a thermal power station (100 kW with 50 kW_{elec}). Two gas burners (310 kW) provide back-up. The first is a condensing boiler (priority) and the second is a low temperature boiler (secondary). Each has heat exchangers in the exhaust systems. The new central building control system can be monitored and controlled over the internet. Another feature is individual control of the temperature in each apartment and exhaust air from all bathrooms. Fresh air is supplied either through slits in the windows of the common rooms and apartments or over solar air collectors for some apartments. In the new bathrooms exhaust fans were installed to ensure sufficient ventilation of the apartments. The energy efficient fans have built in regulators. Since the retrofitting the increased daylight in the common rooms and daylight regulated light switching have significantly reduced electric power consumption.



RENEWABLE ENERGY USE

Air collectors (50 m²) at west and east facades.

PRIMARY ENERGY PERFORMANCE (CONSUMPTION)

Space heating+ water heating + electric (primary energy)

Before: 527 kWh/m²a
 After: 186 kWh/m²a
 Reduction: 65 %

INFORMATION SOURCES

Görres, J.; Erhorn-Kluttig, H.; Reiß, J.; de Boer, J., Erhorn, H., König, A., Kühnle, P.: Erarbeitung und Realisierung eines modellhaften Sanierungskonzepts für ein Alten- und Pflegeheim in Stuttgart-Sonnenberg. <http://archiv.ensan.de>

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