Apartment building "Hoheloogstraße2 in Ludwigshafen DE

PROJECT SUMMARY
Renovation of an apartment building, built in 1960.
94 % reduction of annual heat energy demand (per PHPP).
Almost complies with Passive House Standard

SPECIAL FEATURES
Decentral ventilation sys. With hr, new floor plans and balconies, extensive insulation, pv roof

ARCHITECT
GAG Ludwigshafen am Rhein

OWNER
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SHC
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

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

Before

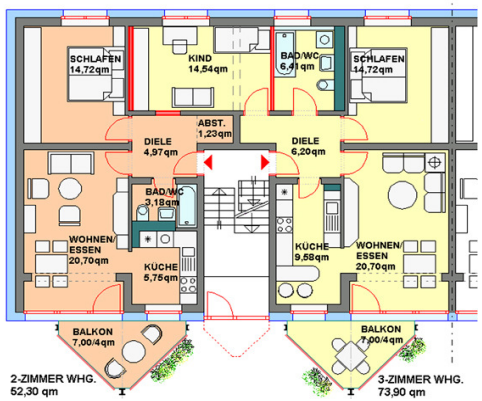
After

BACKGROUND

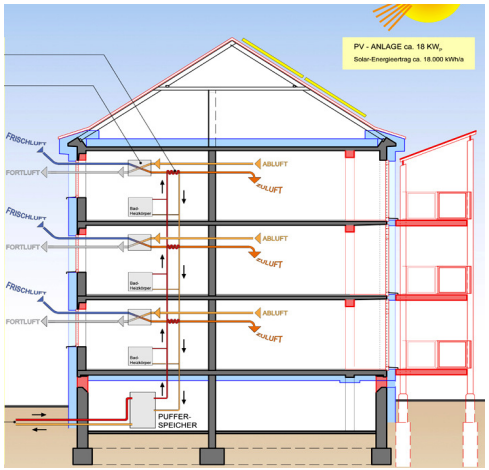
The housing estate “Mundenheim Süd-Ost” in Ludwigshafen, DE was built in 1960 with decentral gas heating stoves, decentral preparation of hot water by electricity and a typical building envelope with an heat energy demand of 250 kWh/m²a . Within the renovation of the whole housing estate one building with 12 apartments almost complied to Passive House Standard after renovation and achieved 16 kWh/(m²a) annual heat energy demand, calculated by Passive House Planning Package (PHPP). The building activity was sponsored by the federal state of Rheinland-Pfalz and “ExWoSt”, a program of the Federal Office for Building and Regional Planning.
The monitoring in 2006 - 2008 verified the energy calculations. The very low energy consumption, the high air quality and the security against building damages are convincing.

SUMMARY OF THE RENOVATION

• improvement of the ground floor: dividing into two flats of different size (before: two equal flats), enclosing part of former balconies
• exterior insulation and finish system
• insulation of basement and attic floor ceiling
• passive house suitable windows (triple glazing)
• decentral ventilation appliances with heat recovery
• new electric and sanitary installation
• demolition of the existing balconies
• mounting of new balconies, stand-alone in front of the facade



Ground floor



Section

Reduction of thermal bridges by erecting stand-alone balconies in front of the facades

CONSTRUCTION

Roof construction *U-value: 0.11 W/(m²·K)*

(top down)	
expanded polystyrene	300 mm
standard concrete (existing)	140 mm
plaster (existing)	15 mm
total	455 mm

Wall construction *U-value: 0.10 W/(m²·K)*

(interior to exterior)	
interior plaster	15 mm
vertically perforated brick (existing)	300 mm
exterior plaster (existing)	20 mm
extruded polystyrene	300 mm
exterior plaster (new)	10 mm
total	645 mm

Basement ceiling *U-value: 0.17 W/(m²·K)*

(top down)	
anhydrite floor	40 mm
footstep sound insulation	40 mm
reinforced brick floor (existing)	170 mm
mineral wool insulation	40 mm
extruded polystyrene	80 mm
total	370 mm

Removal of the existing balconies - one of the greatest thermal bridges


windows in isulation layer


eaves lath to avoid thermal bridges


30cm perimeter insulation

Summary of U-values W/(m²·K)

	Before	After
Attic floor	0.52	0.11
Walls	1.33	0.10
Basement ceiling	0.66	0.17
Windows	2.80	0.86

BUILDING SERVICES

The existing decentral gas heating stoves were replaced by decentral ventilation appliances with heat recovery (efficiency >80%). The remaining demand on heat energy is covered by a gas-fueled combined heat and power unit which supplies the whole housing estate.

RENEWABLE ENERGY USE

The roof areas are extensive used by PV (~ 150 m² with an nominal output of 12.8 kW_p)

ENERGY PERFORMANCE

Heat ing energy demand (according to PHPP)
Before: 250 kWh/m²a
After (PHPP): 16 kWh/m²a
Reduction: 94 %

Primary energy demand (heating, hot water and technical electricity according to PHPP)
After: 45 kWh/m²a

INFORMATION SOURCES

Passive House Institute, Darmstadt, DE
www.passiv.de
GAG Ludwigshafen am Rhein
www.gag-ludwigshafen.de

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