



after refurbishment



before refurbishment

GENERAL INFORMATION	
Building owner	GIWOG
Address	Makartstraße, Linz, upper Austria
Number of dwellings	50 before and after refurbishment
Number of floors	5
Average size of the dwellings	55 m ² before refurbishment 62 m ² after refurbishment
Total heated floor area	2,789 m ² 3,106 m ²
Year of construction	1957–1958
Year of refurbishment	2005/2006
Has the refurbishment been carried out while the dwelling was occupied?	Yes
Has an independent quality assurance been carried out?	No
Total building costs	2,446,000 €
Building costs concerning energy recovery	–

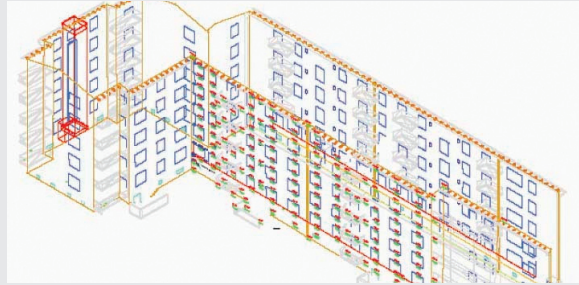


INITIAL SITUATION/LOCAL CONDITION	The walls are built general in scoria bricks (with bad static). Ceilings in concrete with steel. Windows are changed individual (most of them in plastics). The situation of the object next to busy Makart Street did not allow a qualitative use of balconies due to enormous pollution an noise! Good infrastructure
TYPE OF REFURBISHMENT (MEASURES WHICH HAVE BEEN CARRIED OUT)	<ul style="list-style-type: none"> • Integration of gap-facade panels and low energy windows into prefabricated wall-elements • controlled room ventilation with heat recovery (single room) • enlargement of balconies with integration in thermal wrap by increasing the living space (317.43 m²) • new entrance doors to the apartments (insulation, noise, air tightness) • warm water preparation: instead of heat exchanger by gas, heat exchanger by district heating • sun- and light hading integrated into the windows • reinforce insulation of top floor an cellar ceiling • electricity installation new in stair rooms • new roofing • additional installation of lifts • change of the parking situation in connection with the pavement
WHY HAVE THE MENTIONED MEASURES BEEN CARRIED OUT?	degrade the heat energy demand; increase the living comfort, increase the living space by closed balconies ...

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ENERGY RELATED ACTIVITIES			
Exterior components	<ul style="list-style-type: none"> insulation of the whole heated envelope new entrance doors to the apartments new windows with passiv house standard 		
Systems engineering	<ul style="list-style-type: none"> warm water preparation: instead of heat exchanger by gas, heat exchanger by district heating controlled room ventilation with heat recovery (single room) 		
ENERGY RELATED INDICATORS			
Energy performance	Initial situation	After refurbishment	Reduction
	179 kWh/m ² a	14.4 kWh/m ² a	90 %
Energy consumption	500,000 kWh/a	45,000 kWh/a	90 %
CO ₂ -emission	57.3 kg/m ² a	4.5 kg/m ² a	kg/m ² a
Heating system	district heating	district heating	
DHW-system	heat exchanger by gas	heat exchanger by district heating	
Monitoring system	no	a system will be installed in the year 2008	
Regional energy costs	14,150 €/a (heating)	1,274 €/a (heating)	
SUBSIDIES			
	<ul style="list-style-type: none"> not repayable subsidy of BMVIT (Federal Ministry of Transport, Innovation and Technology) € 300.000 repayable annuity subsidy of the province of upper Austria for 25 years and 40 % of the invest costs 		
STATEMENT			
	the tenant satisfaction and the competitiveness compared to new buildings have been increased by the comprehensive thermal modernization of the building. Furthermore a contribution to the climatic protection was made.		
CONTACT			
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