



after refurbishment




before refurbishment



GENERAL INFORMATION	
Building owner	Azienda Lombarda Edilizia Residenziale (ALER)
Address	housing scheme on viale Liguria-viale Lombardia
Number of dwellings	about 6,000 dwellings, distributed in 61 buildings the refurbishment has involved 40 buildings, and about 4,000 dwellings
Number of floors	for the most building 9 floors
Average size of the dwellings	66 m ² before and after refurbishment
Total heated floor area	about 392,250 m ² before and after refurbishment
Year of construction	1968
Year of refurbishment	2000
Has the refurbishment been carried out while the dwelling was occupied?	Yes
Has an independent quality assurance been carried out?	Yes, by a testing surveyor
Total building costs	cost of natural gas for heating before refurbishment 3,900,000 €/year cost of natural gas for heating after refurbishment 3,650,000 €/year
Building costs concerning energy recovery	5,526,000 €



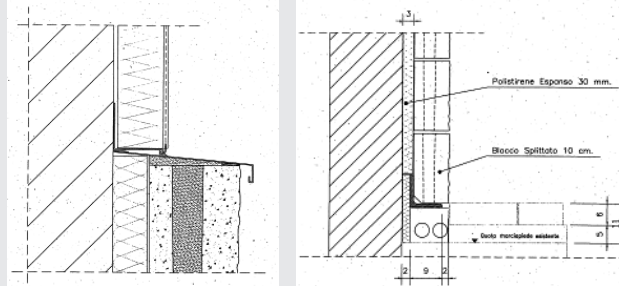
INITIAL SITUATION/LOCAL CONDITION	 <p>Pre-casted concrete panels with no kind of insulation. Pitched and flat roof not insulated as well. U value wall = 1.60 W/m²K U value roof = 1.99 W/m²K</p> <p>the outer wall: concrete panels</p>
TYPE OF REFURBISHMENT (MEASURES WHICH HAVE BEEN CARRIED OUT)	insulation of the outer wall with a polystyrene panel 3 cm thick. In the wall to the ground, at the basement, the panel is protected by a concrete brick. Also the roofs are insulated by a 3 cm thick polystyrene panel.
WHY HAVE THE MENTIONED MEASURES BEEN CARRIED OUT?	In order to reduce the heating consumption and related costs.

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PLANS



ENERGY RELATED ACTIVITIES	the heat generator serves all the scheme: the installed thermal power		
Exterior components			
Systems engineering	is about 50 MW, but there was no action on it		
ENERGY RELATED INDICATORS	Initial situation	After refurbishment	Reduction
Energy performance	190.75 kWh/m ² a	178.50 kWh/m ² a	6.42 %
Energy consumption	74,825,400 kWh/a	70,028,900 kWh/a	6.41 %
CO ₂ -emission	56.70 kg/m ² a	53.06 kg/m ² a	
Heating system	district heating with natural gas fuel	district heating with natural gas fuel	
DHW-system	individual boiler	individual boiler	
Monitoring system	not present	remote controlling system	
Regional energy costs	natural gas 0.5 €/m ³		

SUBSIDIES	100 % from the funding of Regione Lombardia (for social housing)
STATEMENT	The estimated savings were about 10 %. The actual reduction is less than expected, and it is due mainly to a managing problem. The refurbishment is not so worth, if the tenants use the windows as the only existing temperature regulation.
CONTACT	ALER di Milano viale Romagna 20133 Milano