LINZ (Austria)

91 % energy saving

Total living expenses lower than before renovation

High acceptance from the tenants

Project data

Location, address:	Makartstraße, Linz
Region:	Upper Austria (Oberösterreich)
Climate:	Continental and warm
Heating degree days:	3.530 heating degree days
Year of construction:	1957
Year of renovation:	2005
Typology:	Apartment building
No of dwellings:	50
Total floor area:	3106 m^2
Owner:	GIWOG (social housing association)
Renovation design team:	ARGE Arch.DI Gerhard Kopeinig, DI Ingrid Domenig-Meisinger
Costs of energy saving measures:	€ 2,446,000 (incl. VAT)
Specific costs of energy saving measures	€ 787 per m² living area (inkl. VAT), total costs, non energetic measures included
Renovation financed by:	The owner; also with subsidies from Federal and Regional Government

Figure 1: Building after renovation

Objectives and Results

The main reasons for the renovation were complaints by tenants regarding poor usability of the balconies because of the strongly increased traffic frequency on the street below. Additionally, the building was due to renovation, high energy costs and the wish to do a pilot project to collect experience for other projects also were part of the motivation.

Now, after the renovation, the tenants are very happy about their new living quality. For example, a tenant was suffering from a dust allergy. She reported that now, after the renovation and installation of the mechanical ventilation, the symptoms disappeared and she does not have difficulties in breathing any longer.

Renovation concept

Key renovation features

- Insulation of facades, floors, roofs
- Triple glazing of windows including an anti-glare shield
- Mechanical ventilation with heat recovery for each room
- Very high insulation of the outside walls by using a “GAP-solar façade”

State-of-the-art

Before renovation	After renovation
Constructions [U-values: W/m²K] • Outside walls [1.20] • Roof [0.90] • Cellar ceiling [0.70] • Windows [2.50]	*Constructions [U-values: W/m²K]* • Outside walls [0.08] • Roof [0.09] • Cellar ceiling [0.21] • Triple glazing of windows [0.86]
Installations • Gas boiler	*Installations* • District heating • Mechanical ventilation with heat recovery for each room

Energy saving and monitoring

Energy consumption before renovation:
Energy need for heating: 179.0 kWh/m²a

Energy consumption after renovation:
Energy need for heating: 14.4 kWh/m²a

Calculation methode not PHPP, but OIB (official Austrian methode) [2]

Figure 3: "building before renovation

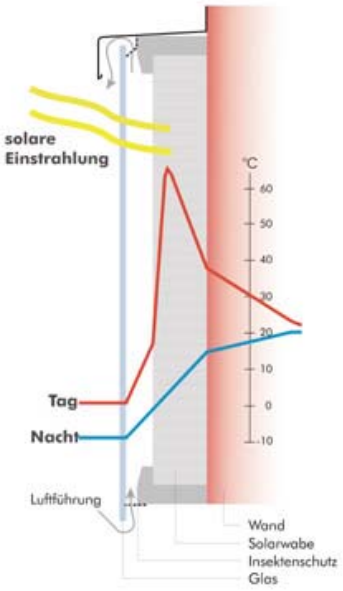

Figure 2: "GAP-solar façade"

Additional information

- Now, after the renovation, the apartments offer a much higher user comfort, also due to a new lift, the enlargement and glazing of the balconies and the mechanical ventilation with heat recovery for each room.
- Another measure was the switch from gas boiler to district heating which in Linz is partly produced by biomass.
- Three meetings were organized for the tenants, where they were informed about the renovation measures. In the beginning, there were a number of critical voices, as a result of this active information policy, a high acceptance was achieved.

Lessons learned and conclusions

- The building was in need of renovation, the balconies were nearly unusable because of the heavy traffic resulting in dirt and noise exposure.
- It is worthwhile to involve and inform the tenants.
- Due to the pilot character of this project, a significant effort was necessary which, however, fully justified by the result.
- New buildings of this housing association will be equipped with mechanical ventilation from now on.

References

[1] Gemeinnützige Industrie-Wohnungsaktiengesellschaft (GIWOG), Welser Straße 41, 4060 Leonding
[2] Österr. Wirtschaftsverlag (Herausgeber): Staatspreis 2006 für Architektur und Nachhaltigkeit