



## LINZ (Austria)

**30 % energy saving**  
**Better room climate**  
**Reduction of heating costs – despite cold winter 05/06**

### Project data

Location, address:	Grünthalerstraße 4 & 4a, 4020 Linz
Region:	Upper Austria
Climate:	Continental
Heating degree days:	3530 heating degree days
Year of construction:	1971
Year of renovation:	2005
Typology:	Apartment building
No of dwellings:	23
Total floor area:	1,559 m <sup>2</sup>
Owner:	Joint ownership of the apartment owners
Renovation design team:	Familie (social housing association) – Ing. Harald Matheisl M-P-T Engineering GmbH – Dipl.-Ing. Reinhard Schild
Total costs of renovation:	€ 600.000
Renovation financed by:	Loan taken by Familie on behalf of the owners, owners; subsidies from Regional Government



Figure 1: Building after renovation

### Objectives and Results

The building was constructed in 1971. After more than 30 years the visual impression of the building was not very appealing. That is why the renovation of the roof was combined with an overall renovation of the building.

The energy consumption for heating (January to May – most recent data available) was reduced from 198,555 kWh to 145,235 kWh, which means that about 27% heating energy are saved. The energy performance indicator after the renovation is 48 kWh/m<sup>2</sup>,a.

### Renovation concept

#### Key renovation features

- Insulation of façade
- Insulation of ground floor
- Insulation of top ceiling and roof
- Partly new windows
- Renewal of the entrance areas (outside doors)
- Renovation of the balconies
- New roof

## State-of-the-art

### Before renovation

#### Constructions [U-values: $W/m^2K$ ]

- Outside walls [1.22]
- Roof [3.50]
- Top ceiling [0.51]
- Cellar ceiling [1.25]
- Windows [2.50]

#### Installations

- Gas heating system

### After renovation

#### Constructions [U-values: $W/m^2K$ ]

- Outside walls [0.26]
- Roof [0.21]
- Top ceiling [0.14]
- Cellar ceiling [0.31]
- Windows [2.15] (average)

#### Installations

- Complete renewal of the gas heating system, new boiler, new radiators in each apartment

## Energy saving and monitoring

#### Energy consumption before renovation:

kWh (Jan 05 – May 05)\* 198.555  
Energy Performance Indicator:

#### Energy consumption after renovation:

kWh (Jan 06 – May 06)\* 145.235  
Energy Performance Indicator: 48 kWh/m<sup>2</sup>,a  
Percentage saving: 30 %

\* most recent data available



Figure 2: Building during renovation

## Additional information

- Reason and motivation for the renovation was the wish of the owners to improve the visual impression, to bring the building up to the state of the art and to increase the value of the real estate.
- Together with the roof renovation also the wood constructions of the roof framing were renewed.

## Lessons learned and conclusions

- After the insulation of the building and the exchange of the windows the room climate is better.
- Despite the cold winter 2006, in the first heating season after the renovation a very significant reduction of the heating costs was achieved.

## References

- [1] Familie Gemeinnützige Wohnungsgenossenschaft, Hasnerstraße 31, 4020 Linz, Tel.: +43 732 65 34 51, [office@familie-linz.at](mailto:office@familie-linz.at)