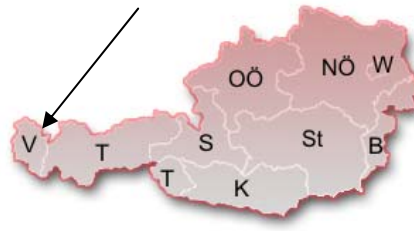




Passive House Retrofit
Best practice example No 1 from Austria



**Rankweil
(Austria)**

91 % energy saving

Total living expenses lower than before renovation

High acceptance from the tenants

Project data

Location, address:	Schleipfweg, Rankweil
Region:	Vorarlberg
Climate:	In the valley, ca. 500 m above sea level
Heating degree days:	3.705 heating degree days
Year of construction:	1978
Year of renovation:	2007
Typology:	apartment building
No of dwellings:	18
Total floor area:	1467 m ²
Owner:	Vogewosi (social housing association)
Renovation design team:	Arch.Andrea Sonderegger
Costs of energy saving measures:	not yet available (ongoing project)
Specific costs of energy saving measures	not yet available (ongoing project)
Renovation financed by:	The owner; subsidies from regional Government



Figure 1: building before renovation

Objectives and Results

The project is one of four ongoing phr-projects of the biggest social housing company in the region of Vorarlberg, Vogewosi. In recent years, the company has renovated all buildings from the 50's 60's and early 70's in a good energetic level.

The four phr-projects aim at an even lower energy need of 25 kWh/m²a (calculated using PHPP), for the project in Rankweil the passive house value of 15 kWh/m²a is the objective (energy need calculated using PHPP).

During the phase of planning, the tenants were informed about the aims, advantages and about the economical effects of the renovation. The decision to renovate in passive house quality was taken unisonously by the tenants.

Renovation concept

Key renovation features

- high level Insulation of facades, basement ceiling and attic floor
- Triple glazed windows
- Minimisation of cold bridges
- Glazed balconies
- Mechanical ventilation with heat recovery (central system)
- High efficiency gas boiler + solar collectors for dhw

State-of-the-art

Before renovation

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

- Outside walls [0.47]
- Attic floor [1.75]
- basement ceiling [0.97]
- Windows [2.65]

Installations

- Gas burner

After renovation

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

- Outside walls [0.13]
- Roof [0.11]
- Cellar ceiling [0.19]
- Triple glazing of windows [0.80]

Installations

- High efficiency gas burner
- Mechanical ventilation with heat recovery for each room

Energy saving and monitoring

Energy consumption before renovation:

Energy need for heating: 198.0 kWh/m²a (PHPP)

Energy consumption after renovation:

Energy need for heating: 15 kWh/m²a (PHPP)

Percentage saving: 93 %

Additional information

- During the planning process, it was decided not only to aim at 25 kWh/m²a, but at the passive house limit of 15 kWh/m²a despite the extra cost for the higher requirements
- For the mechanical ventilation system with heat recovery, a central system was selected, as this makes attendance and change of filters easier. These works can be executed by personnel of the social housing company without bothering the tenants
- several meetings were organized to inform the tenants about the renovation measures. While insulation measures and solar collectors were accepted without problems, there were a number of critical voices in the beginning concerning the ventilation system and the glazed balconies. As a result of the active information policy, a high acceptance was achieved.

Lessons learned and conclusions

- The installation of the ventilation system was carried out, while tenants were living in the house. This was a critical point of discussion. Now, that the installation is nearly finalized, the tenants are happy, that problems were much smaller, than feared before
- It is worthwhile to involve and inform the tenants

References

- www.igpassivhaus.at