



## Best practice example No 5 from Switzerland



## LAUSANNE (Switzerland)

**62% energy saving**

**Moderate rise of total living expenses after renovation**

### Project data

Location, address:	Chemin des Libellules 6-10
Region:	Lausanne
Surroundings:	Suburban area
Climate:	Dry and cold in winter, mild / hot in summer
Heating degree days:	3377
Year of construction and renovation:	1973 (constructed); 1998-1999 (renovated)
Typology:	Apartment building
No of dwellings:	137 dwellings
Total floor area:	9360
Owner:	Caisse de Pensions de l'Etat de Vaud (pension fund)
Architect and Builder:	Synthèse Développement et Conception Sàrl, Keller-Burnier Eng.
Costs of energy saving measures:	Total cost € 41.330 per flat (incl. VAT), cost of balanced ventilation system €3.800 per flat
Renovation financed by:	The owner



### Objectives and Results

The building owner wanted to avoid condensation and fungi problems in apartments after the replacement of old windows with new air tight ones. The installation of a balanced ventilation system needs a deep intervention in apartments. This was not desired by tenants and owner. A smart solution came up with integral planning of the envelope upgrading and by hiding the air distribution pipes in the first layer of the façade insulation. The result is a high energy performance building with very light interventions in apartments and relatively low cost of the intervention.

Figure 1: The building after refurbishment

### Renovation concept

#### Key renovation features

- Insulation of façades and roofs
- High efficiency insulation glazing and frames
- Glazed balconies
- Distance heating
- Low temperature heating
- Balanced ventilation
- Heat recovery

## State-of-the-art

### Before renovation

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

- Poorly insulated roof
- Poor façade insulation (3 cm insulation)
- Double glazing [3]

#### Installations

- Natural ventilation not controlled
- District heating

### After renovation

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

- Insulation of roof [0.2]
- Insulation of façades [0.23]
- High efficiency glazing (HR++) [1.6]
- Glazed balconies

#### Installations

- Balanced ventilation with 83% heat recovery
- Low consumption air handling units ( $0.6 \text{ Wh/m}^3$ )
- Air distribution inside the façade

## Energy saving and monitoring

Energy consumption before renovation:  
kWh/m<sup>2</sup>: 189 (for heating and DHW)

Energy consumption after renovation:  
kWh/m<sup>2</sup>: 72 (for heating and DHW)

Percentage saving: 62%



Figure 2: ventilated façade with the air distribution pipes hidden in the first insulation layer

## Additional information

- The minimalist intervention in apartments respected the owner and tenants wishes to reduce nuisances.
- The building was audited in the framework of the Hope European research project. The planned energy performance is confirmed even 6 years after refurbishment. The indoor environment quality has reached satisfaction and the building was classified as one of the low energy – high indoor environment quality – healthy Swiss buildings audited.

## Lessons learned and conclusions

- Balanced ventilation with heat recovery can be achieved even if interior interventions must be avoided.
- Indoor environment quality, healthy buildings and high energy performance are compatible objectives.
- Glazed balconies are not used in an optimum way by 100 percent of tenants. Some are heated with electrical heaters to extend living area and some are left with open windows reducing the greenhouse effect of the glazed loggias.

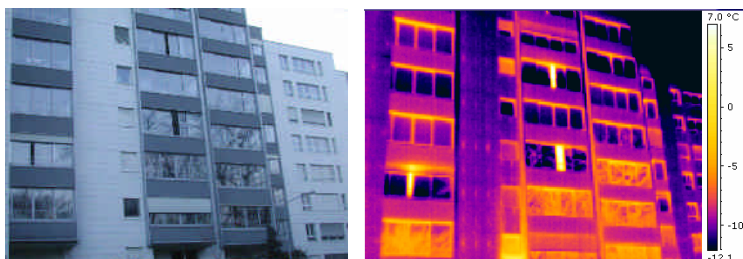


Figure 3: The thermal graph shows different uses of the glazed loggias. We can see 3 external windows and guess some internal windows open. In spite of the variety of tenant behavior, the global energy performance is low.

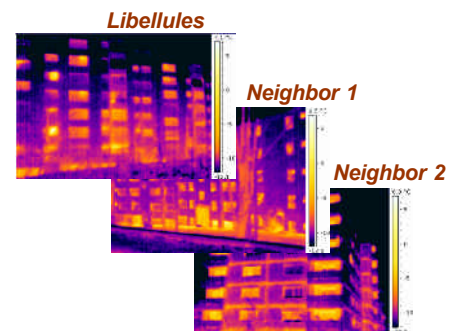


Figure 4: Comparison of Libellules façade with 2 neighboring buildings consuming 2 times more energy (cold weather-10°C with strong wind)

## References

- [1] Rénovation actuelle, Les Libellules préfèrent la ventilation contrôlée, mars-avril 2000, Lausanne