

Kaiserstraße 7, Vienna

1. INTRODUCTION

PROJECT SUMMARY

- Year of construction: 1904
- Monastery building as part of a square ensemble also comprising a church and a residential building. The complete ensemble is monument-protected

SPECIAL FEATURES

- listed building
- interior insulation
- central ventilation system
- innovative window solution based on box-type windows

ARCHITECT:

akp architects, Vienna

Consultant : e7, Vienna

OWNER: Lazarists*

* Congregation of the Mission of the Holy Vincent de Paul

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IEA – SHC Task 47

Renovation of Non-Residential Buildings towards Sustainable Standards

2. CONTEXT AND BACKGROUND

BACKGROUND

- Monastery building with residential use on the top floors
- Building is part of a listed square ensemble (including a church and a residential building) in use
- 4 floors – attic floor not in use (before renovation)
- District heating

OBJECTIVES OF THE RENOVATION

- Multiple use – monastery and residential
- Attic conversion
- Improvement of energy efficiency
- Innovative measures
 - Interior insulation
 - Ventilation system with heat recovery
 - Renovation of box-type windows (keeping appearance from outside)
- Risk and hazard assessment of possible damages at the façade due to interior insulation

SUMMARY OF THE RENOVATION

- Demonstration building as part of a flagship project ('Gründerzeit mit Zukunft')
- Improvement of energy efficiency and comfort criteria
- Continuous monitoring of energy consumption and façade humidity

- Street view before

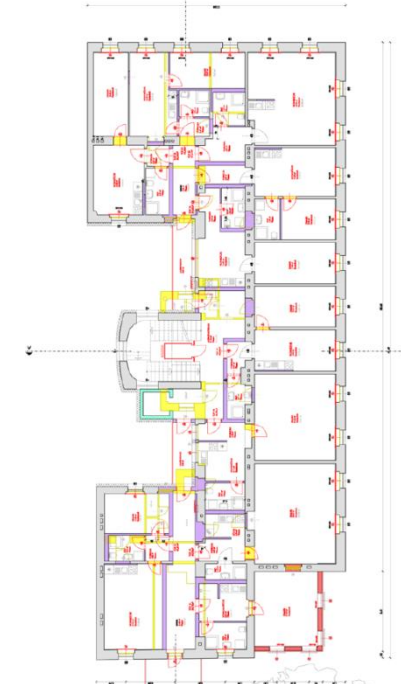
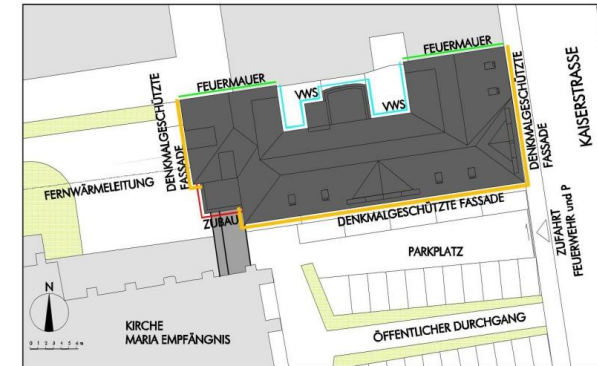


and after renovation



Pictures: Architekten Kronreif_Trimmel&Partner
<http://www.architekten.or.at/>

- Floor plan



3. DECISION MAKING PROCESSES

Building

The ensemble is owned by the Lazarists. Main incentives for the renovation were the required renovation of the façade as well as the wish to improve comfort and to reduce energy consumption.

Architect

Extensive experience in the field of refurbishing historical and listed buildings enabled the development of an innovative concept ...

Public funding

... which could be realized through funding by the federal research program “Building of Tomorrow” (www.hausderzukunft.at)

The project is a demonstration project of the flagship project “Gründerzeit mit Zukunft” (www.gruenderzeitplus.at) which deals with the renovation of historical buildings (before 1919).

- *Historical dormer before and after renovation*



Pictures: Architekten Kronreif_Trimmel&Partner

- *Insulation on fire-proof walls and interior insulation*



Pictures: Architekten Kronreif_Trimmel&Partner

4. BUILDING ENVELOPE

Roof construction : U-value: 0,157 W/m²K

Materials . (Interior to exterior):

Gypsum cardboards	25 mm
Moisture barrier + air space	27 mm
Plywood	15 mm
Rock wool insulation	320 mm
Plywood	24 mm
Air space	80 mm
Lathing	30 mm
<u>Roof brick (to be sustained)</u>	
Total	534 mm

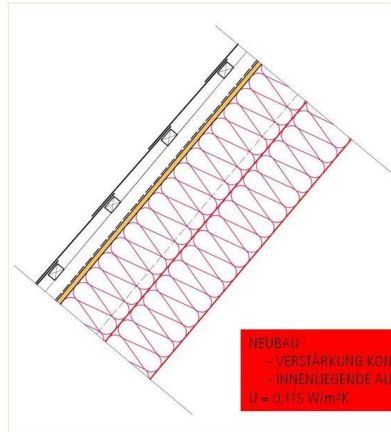
Wall construction : U-value: 0,436 W/m²K

Materials . (Interior to exterior):

Filling	
Capillary-active mineral insulation	50 mm
Chalk-cement plastering	30 mm
Brick	Ø 600 mm
<u>Chalk-cement plastering</u>	<u>30 mm</u>
Total	710 mm

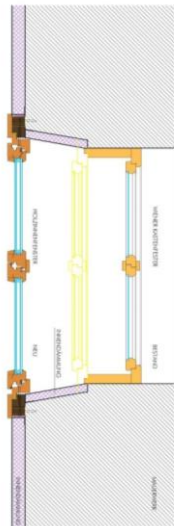
Summary of U-values [W/m²K]

	Before	After
Roof/attic	0,90	0,16
Floor/slab	1,07	-
Walls	0,92	0,44
Ceilings		
Windows	2,20	0,90



NEUBAU
- VERSTÄRKUNG KONSTRUKTION
- INNENLIEGENDE AUFSPARRENDÄMMUNG
U = 0,115 W/m²K

- Cross section of roof construction
- Insulation is to be mounted at the interior to sustain the roof bricks



- Left: window construction in combination with interior insulation (from interior to exterior)
- Right: Construction with 5cm calcium silicate panel (accumulation of humidity in the wall construction is monitored)



Pictures: Architekten Kronreif_Trimmel&Partner

5. BUILDING SERVICES SYSTEM

OVERALL DESIGN STRATEGY

HEATING SYSTEM

- Before: district heating (radiators)
- After: district heating radiators in the lower floors
space heating systems in the upper floors

VENTILATION

- Before: natural ventilation (no mechanical systems)
- After: mechanical ventilation system with heat recovery in 2nd, 3rd floor and attic conversion; the air handling unit is installed in the basement

HOT WATER PRODUCTION

- Before: central (district heating)
- After: central for the lower floors;
decentralized for the upper floors

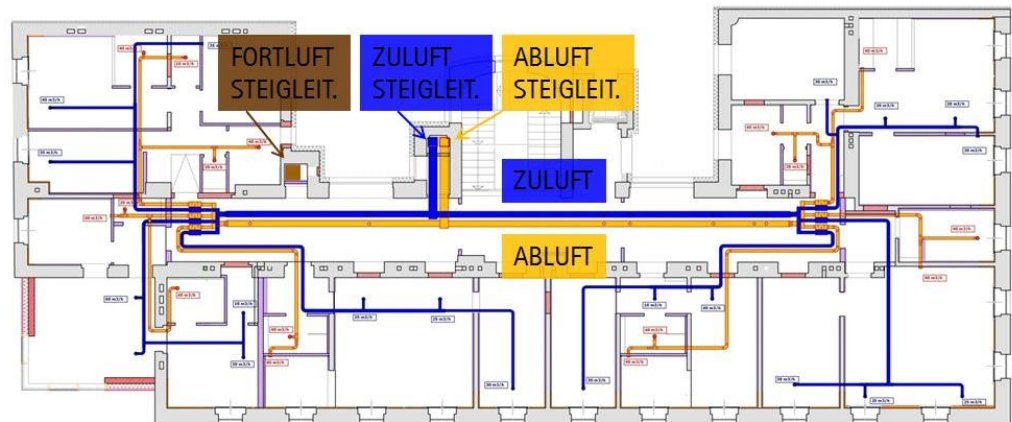
- Air ducts in the suspended ceiling with sound absorbers



- Decentralized domestic warm water preparation



- Cross floor plan 3rd floor (ventilation system)



Pictures: Architekten Kronreif_Trimmel&Partner

6. ENERGY PERFORMANCES

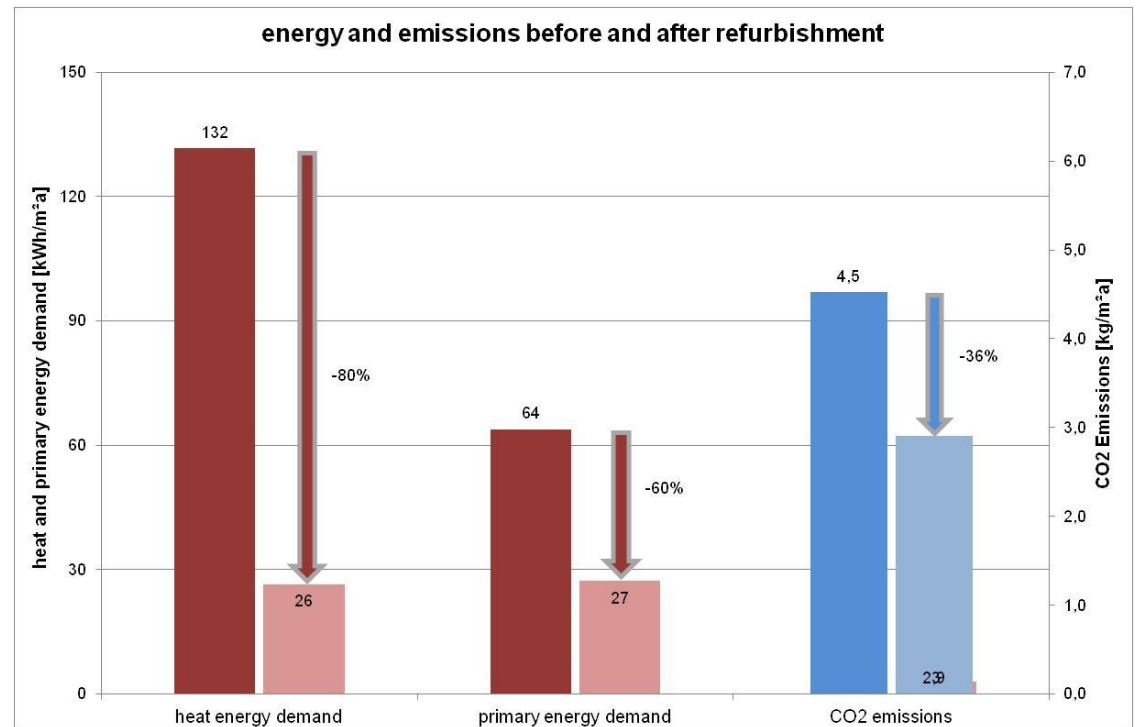
- Energy performance (kWh/m^2)
A good energy performance was achieved by reducing the heat losses through walls and windows of the building stock, a high standard attic conversion, innovative window solution and installing a ventilation system with heat recovery

The calculated heat demand is reduced to about $26 \text{ kWh/m}^2\text{a}$, which means a reduction of the specific demand of almost 80%

Even comfort and convenience in use could be increased significantly – and though additional energy flows for ventilation occurred, the primary energy demand could be reduced by 60%

The building is provided with district heating which has a positive effect on the primary energy demand and CO₂ emissions

Heating- and primary energy demand and CO₂- emissions



7 ENVIRONMENTAL PERFORMANCE

The building is going to receive the certificate for sustainable building (TQB - Total-Quality- Building) by the Austrian Sustainable Building Council (ÖGNB – www.oegnb.net)

Main criteria of the certificate cover

- energy performance
- ecological materials
- life-cycle cost

The indoor climate of the residences is monitored and evaluated over a two-years period after finishing of construction works

Energy consumption and hot water demand is monitored and evaluated in a two-year period

Social evaluation

- Supposed to be one year after completion (autumn 2014)
- satisfaction with the building / with the dwelling
- satisfaction with the technical equipment

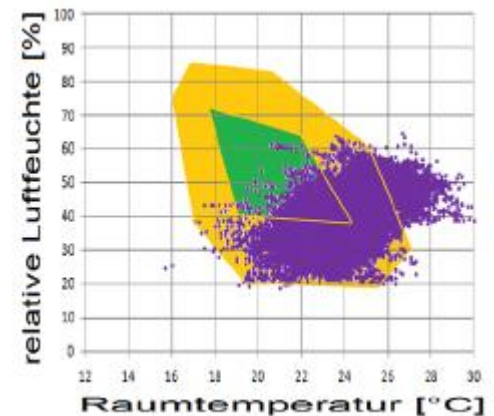
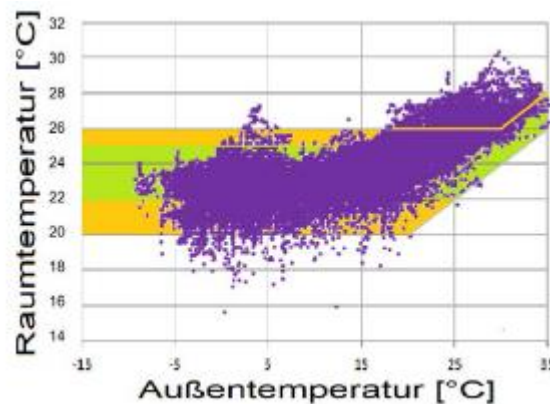
Monitoring hardware in a demonstration object:

Picture: e7 (<http://www.e-sieben.at/>)



Monitoring of comfort criteria (15min period)

- Left picture: room temperature against ambient temperature
- Right picture: humidity against room temperature



8. MORE INFORMATIONS

OTHER INTERESTING ASPECTS

The project is included in the lead-project “Gründerzeit mit Zukunft” (www.gruenderzeitplus.at) (Gründerzeit with future: Innovative Modernisation of Wilhelminian style Buildings)

The project is focusing on the holistic modernization of houses of the era of promoterism (year of construction before 1919).

The key aspects are

- *economic efficiency*
- *energy efficiency*
- *legal framework*
- *users satisfaction*

which are researched in 4 demonstration objects located in Vienna.



Object Weißgrillgasse, 1140 Vienna: before (left) and after (right) comprehensive refurbishment and attic expansion

Pictures: Ulreich, Gassner & Partner



*Object Eberlgasse, 1020 Vienna
- First modernization of a historic building to passive house standard
- water/water heat pump
- air ventilation system*

Picture: e7



*Object Davids Corner, 1100 Vienna
- Modernization of three historic buildings located next to each other*

Picture: BLUESAVE (www.bluesave.at)