

# Kaiserstraße 7, Vienna

## 1. INTRODUCTION

### PROJECT SUMMARY

- *Year of construction: 1904*
- *Monastery, which is part of a square building complex that includes a church and a residential building. The complete complex 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 boxed-type windows (sustainment of appearance)
- Hazard assessment of possible consequences of interior insulation for facade damage.

### SUMMARY OF THE RENOVATION

- Flagship building
- Improvement of energy efficiency and comfort
- Continuous monitoring of energy consumption and façade humidity

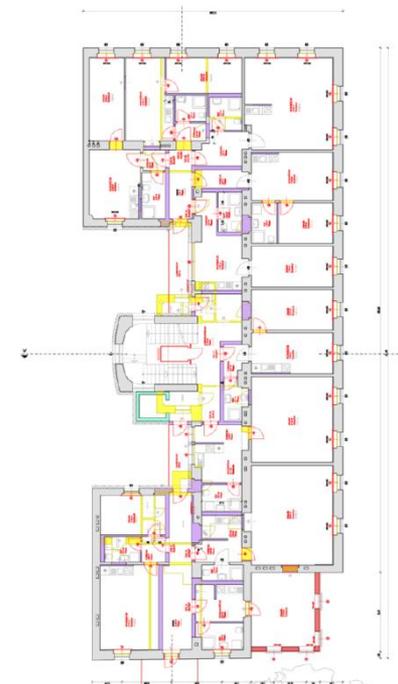
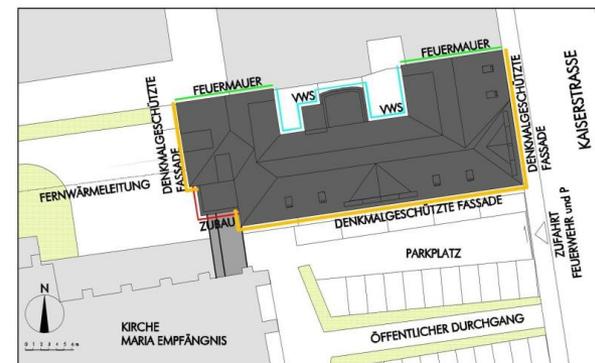
Street view before...



...and after renovation



Floor plan



Pictures: Architekten Kronreif\_Trimmel&Partner  
<http://www.architekten.or.at/>

### 3. DECISION MAKING PROCESSES

#### Building

The complex 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](http://www.hausderzukunft.at))

The project was included as a demonstration project in the lead-project “Gründerzeit mit Zukunft“ ([www.gruenderzeitplus.at](http://www.gruenderzeitplus.at)), which deals especially 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/m<sup>2</sup>K

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>	
<b>Total</b>	<b>534 mm</b>

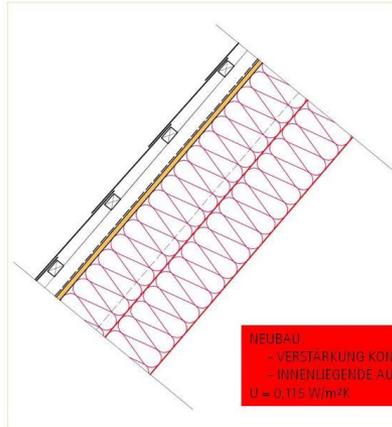
**Wall construction** : U-value: 0,436 W/m<sup>2</sup>K

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>
<b>Total</b>	<b>710 mm</b>

### Summary of U-values [W/m<sup>2</sup>K]

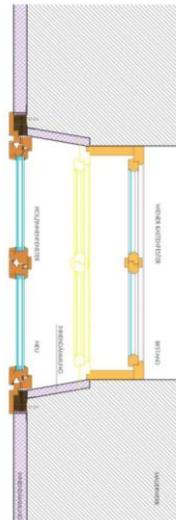
	Before	After
Roof/attic	0,90	0,16
Floor/slab	1,07	-
Walls	0,92	0,44
Ceilings		
Windows	2,20	0,90



NEUBAU  
- VERSTÄRKUNG KONSTRUKTION  
- INNENLIEGENDE AUFSPARRENDÄMMUNG  
U = 0,115 W/m<sup>2</sup>K



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



- Left: window construction in combination with interior insulation

- Right: Construction with 5cm calcium silicate panel (the 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 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

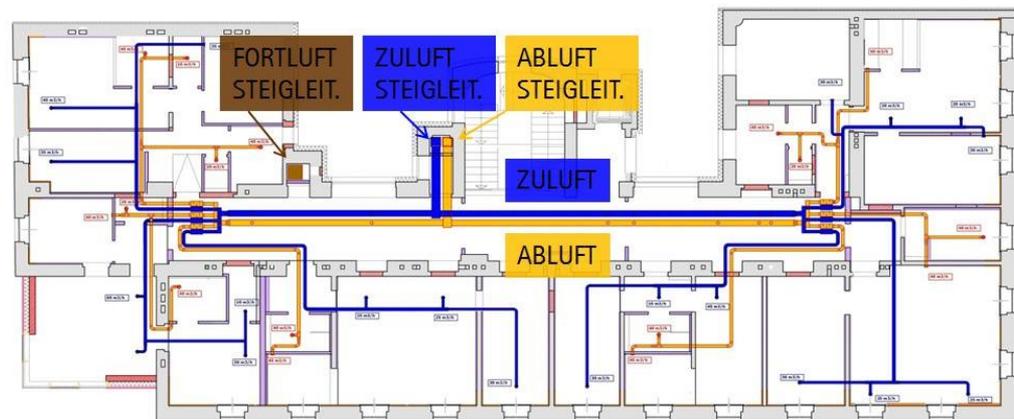
*Air ducts in the suspended ceiling with sound absorbers*



*Decentralized domestic warm water preparation*



*Cross floor plan 3<sup>rd</sup> floor (ventilation system)*



Pictures: Architekten Kronreif\_Trimmel&Partner

## 6. ENERGY PERFORMANCES

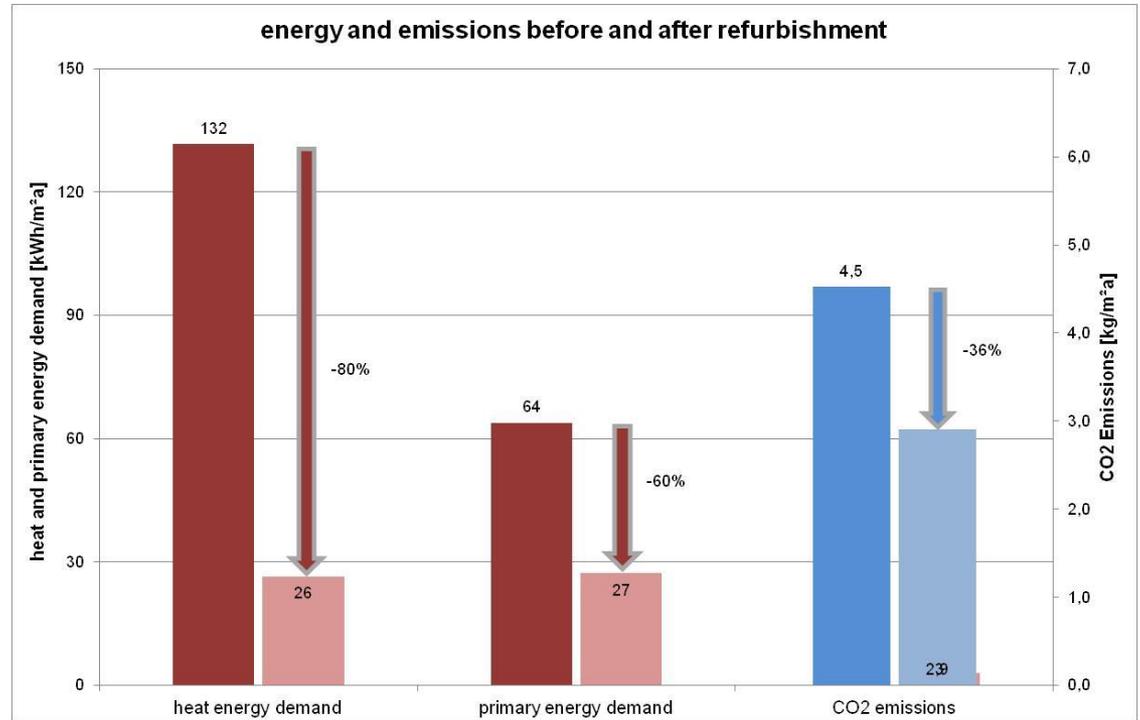
- Energy performance ( $\text{kWh/m}^2$ )  
*Good energy performance was achieved by reducing the heat losses through walls and windows of the building stock, a high standard attic conversion, innovative window solution and installing a ventilation system with heat recovery*

*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 therefore additional energy flows for ventilation could occur – 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 CO<sub>2</sub> emissions*

## Heating- and primary energy demand and CO<sub>2</sub>- 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](http://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 for a two-year period

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

Social evaluation

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

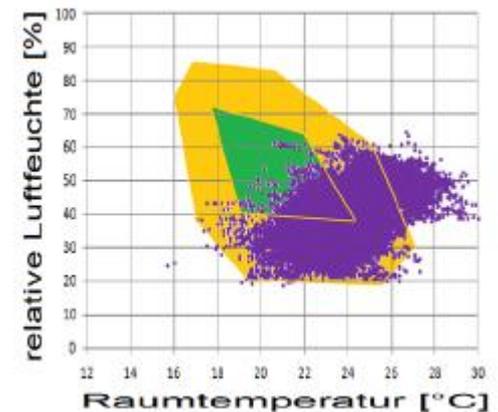
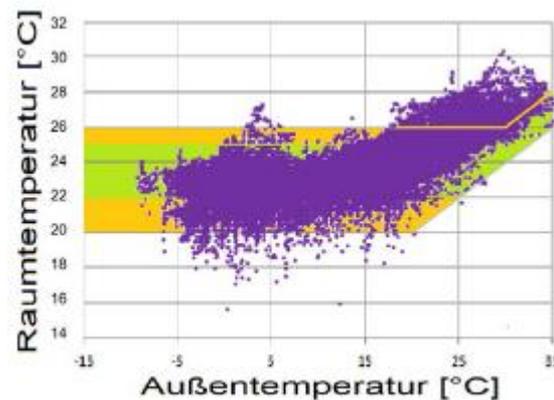
### Monitoring hardware in a demonstration object

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 INFORMATION

### OTHER INTERESTING ASPECTS

The project is included in the lead-project “Gründerzeit mit Zukunft” ([www.gruenderzeitplus.at](http://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 promodernism (year of construction before 1919). Four demonstration buildings are located in Vienna.

The key aspects are:

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



*Wißgrillgasse (Wißgrill Alley) before and after comprehensive reconstruction and attic expansion*

Pictures: Ulreich, Gassner & Partner



*Eberlgasse (Eberl Alley)*  
- First modernization of a historic building to passive house standard  
- water/water heat pump  
- air ventilation system

Picture: e7



*Davids Corner*  
- Modernization of three historic buildings located next to each other

Picture: BLUESAVE ([www.bluesave.at](http://www.bluesave.at))