

# 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*

Authors: *Walter Hüttler, Johannes Rammerstorfer*  
Contact: [walter.huettler@e-sieben.at](mailto:walter.huettler@e-sieben.at)



## 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 .....

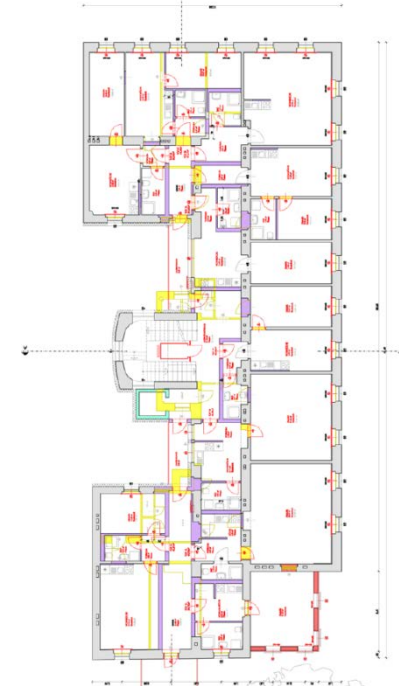
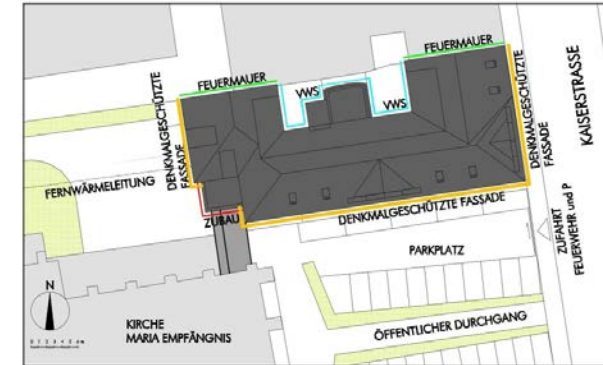


and after renovation



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

The project is a demonstration project of the flagship project "Gründerzeit mit Zukunft" ([www.gruenderzeitplus.at](http://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/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> |

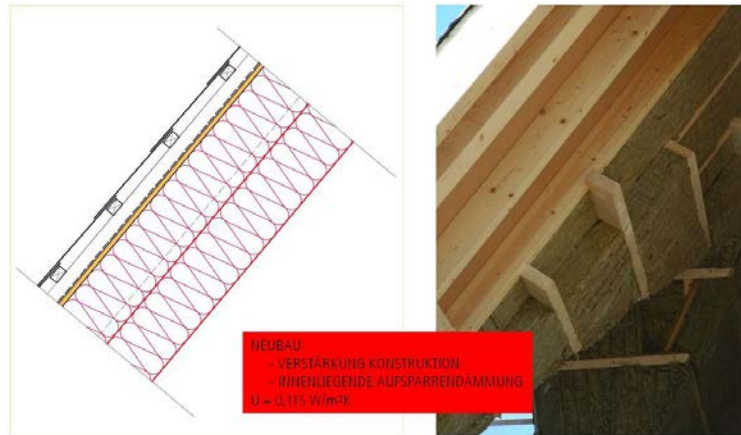
**Wall construction** : U-value: 0,436 W/m<sup>2</sup>K

Materials . (Interior to exterior):

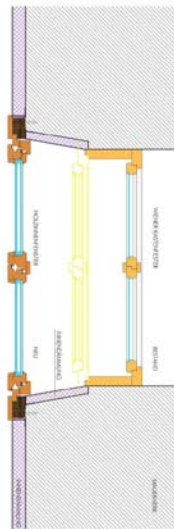
|                                     |               |
|-------------------------------------|---------------|
| Filling                             |               |
| Capillary-active mineral insulation | 50 mm         |
| Chalk-cement plastering             | 30 mm         |
| Brick                               | 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  |



- 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 2<sup>nd</sup>, 3<sup>rd</sup> 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

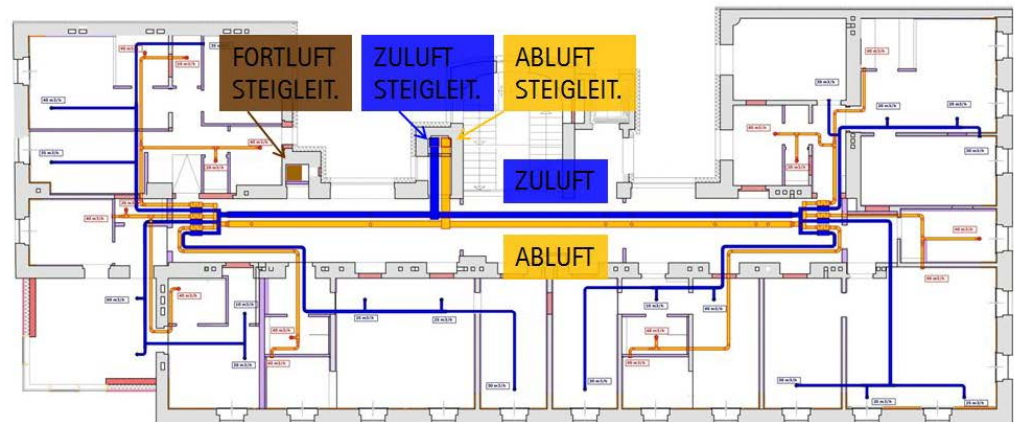
- Air ducts in the suspended ceiling with sound absorbers



- Decentralized domestic warm water preparation



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



Pictures: Architekten Kronreif\_Trimmel&Partner

## 6. ENERGY PERFORMANCES

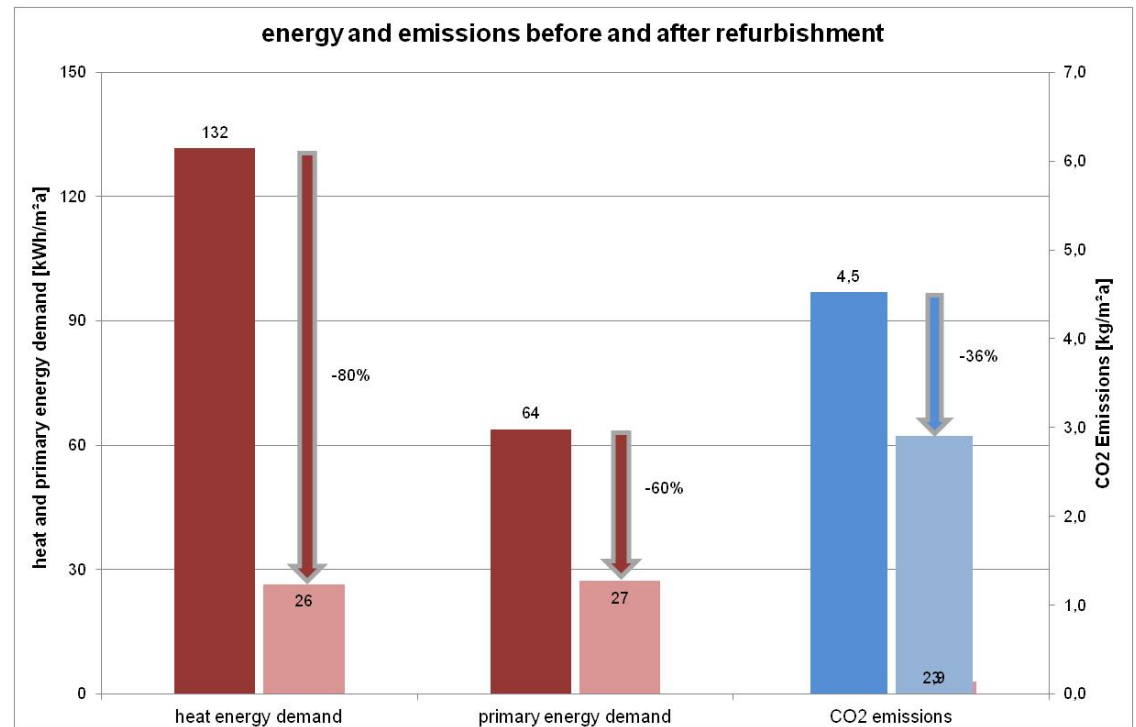
- Energy performance ( $\text{kWh/m}^2$ )  
*A good energy performance was achieved by reducing the heat losses through walls and windows of the building stock, a high standard attic conversion, innovative window solution and installing a ventilation system with heat recovery*

*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 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 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

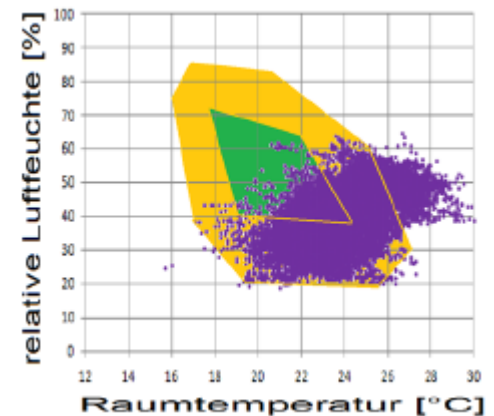
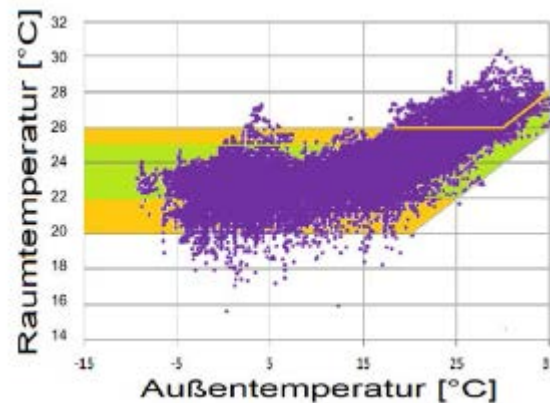
Monitoring hardware in a demonstration object:

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](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 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](http://www.bluesave.at))