

Franciscan Monastery, Graz, Austria

1. INTRODUCTION

PROJECT SUMMARY

- first parts 1239
- main parts from 1250 to 1650
- protected monument

SPECIAL FEATURES

Mission of the Franciscans: Conservation and preservation of the Creation, technical implementation through

- component heating
- heat pump
- solar thermal panels

ARCHITECT

*HoG architektur ZT GmbH
Architekt DI Michael Lingenhölle*

CONSULTANT

TB Köstenbauer & Sixl GmbH

OWNER

Order of Franciscans



© Alexander Gebetsroither

Brochure authors: TU Graz, Sophie
Grünewald; ÖGUT, Claudia Dankl
Contact: claudia.dankl@ogut.at

IEA – SHC Task 47

Renovation of Non-Residential Buildings towards Sustainable Standards



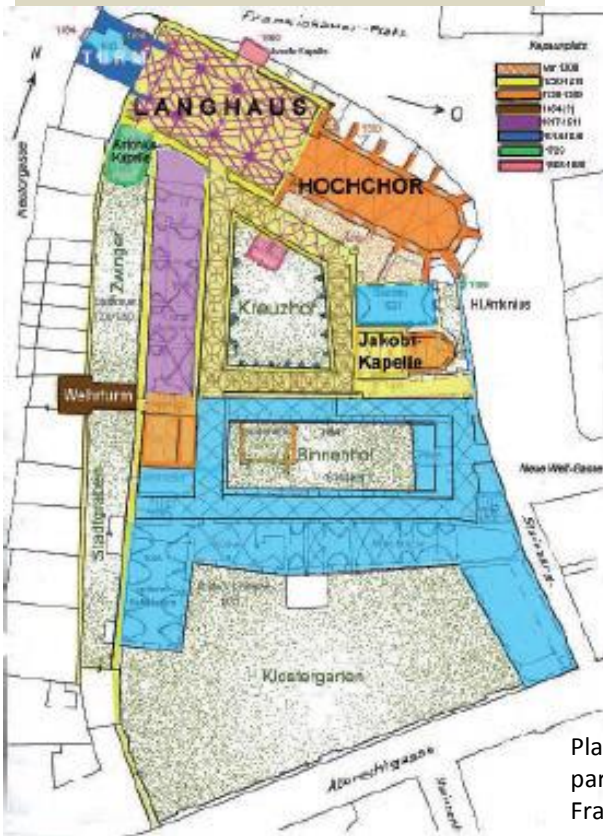
Centre
Square

Monastery

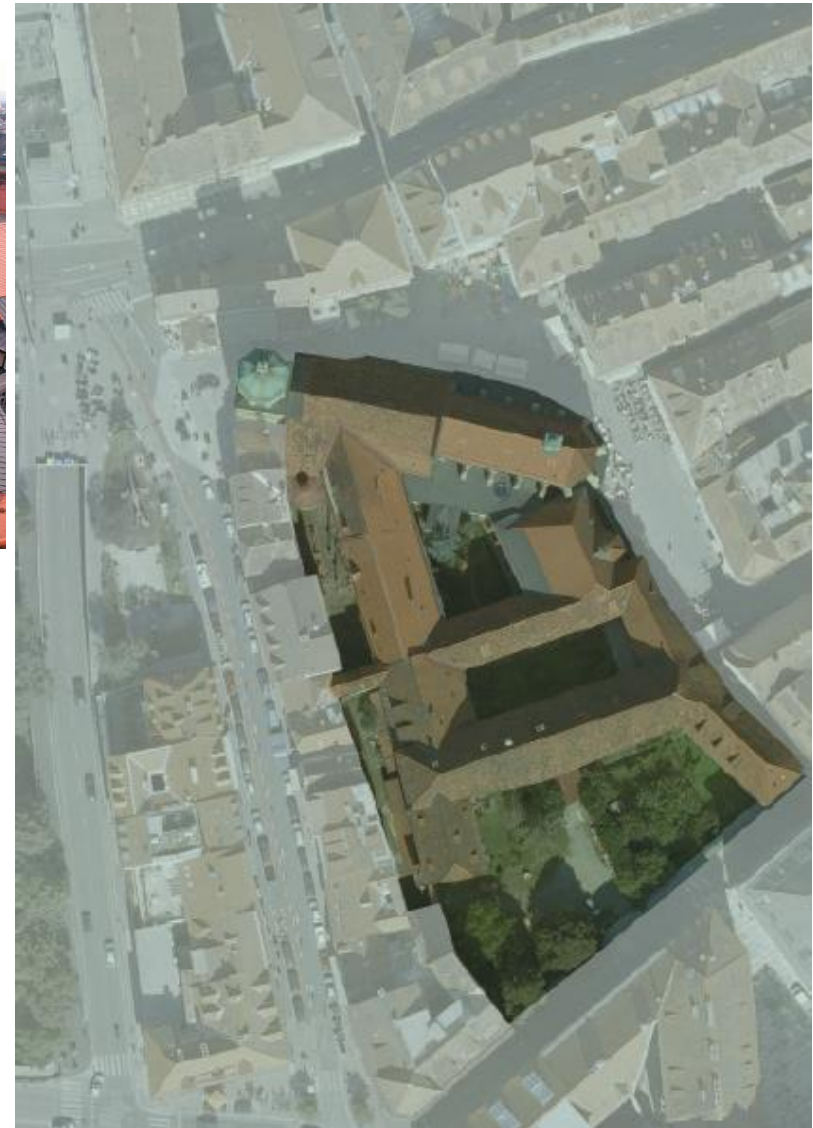
Layout: Göllés,
www.gams4.com

Aerial picture 2007 (Source: Urban measuring Graz)

Right: Typical pitched roof shape of the monastery and other historic buildings in Graz (Source: Franciscans, Graz)



Plan of the building stages - main parts from 1250 to 1650 (Source: Franciscans, Graz)



Source: project new4old, www.new4old.eu

2. CONTEXT AND BACKGROUND

BACKGROUND

- *Medieval building structure, parts of the historic city walls*
- *Franciscan monastery (living areas of the friars, meeting rooms, seminar rooms, library,..)*

OBJECTIVES OF THE RENOVATION

- *Mission of the Franciscans: conservation and preservation of the Creation*
- *reduce heating costs in order to save operational costs*
- *new urban functions (meeting rooms, conference center, event rooms)*

SUMMARY OF THE RENOVATION

- *Installation of a a solar power plant*
- *Installation of heat pumps,*
- *Floor partially insulated with foam glass gravel,*
- *Installation of a component heating*
- *Attic conversion*
- *Energy performance before retrofit: 183,10 kWh/m²a*

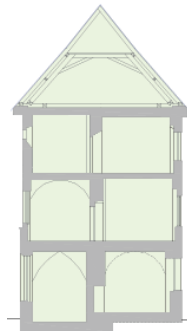


Non-renovated patio

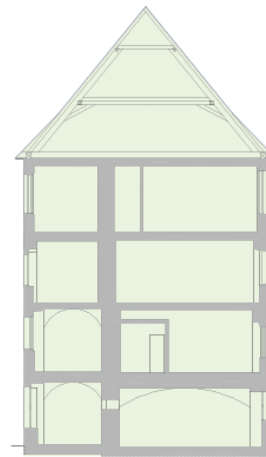


Patio (non-renovated left wing) with solar plant

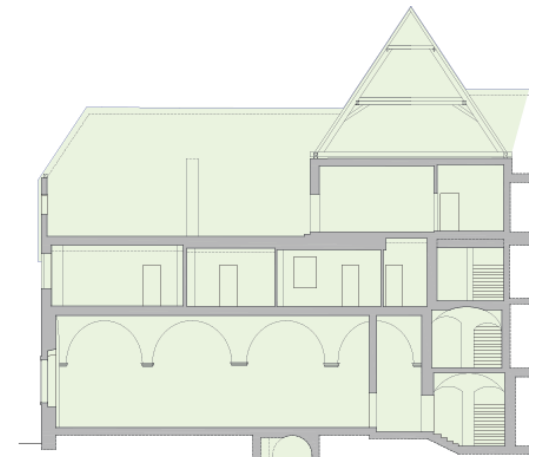
Section



central wing



south wing



south-west wing

MASTERPLAN FOR THE RENOVATION

The monastery as a place of welcome: 11 focus areas worked out by the friars together with architect Lingenhölle from 2001 to 2007



CONFERENCE CENTRE

Vorträge, Symposium, Sitzungen...
(Räume bereits saniert)
→ Zugang über Franziskanerplatz-Kreuzhof

MONASTERY HOSTEL

Herberge in zu sanierendem alten Klosterzellentrakt (im nördl. Westtrakt 2.OG)
→ Zugang über Franziskanerplatz-Kreuzgang-Westtrakt und Kreuzgang-Nordtrakt

YOUTH

Kultursaal Doppelnutzung (Umbau und Sanierung) und zu adaptierende Jugendprojekträume: Begegnungsräume, Matratzenlager
→ Zugang über Kreuzgang

CULTURE

Kultursaal und angrenzende Räume: Pflege des kulturellen Schaffens im Kloster (Förderung Architektur, Bildhauerei, Malerei, Musik...)
→ Zugang über Kreuzgang

LIBRARY, LITERATURE

Bestehende wertvolle Bibliothek, Bibliothek-Neubau, Ausstellung | Empfang im zu sanierenden Festsaal, Forschungszentrum im nördl. Westtrakt 1.OG
→ Zugang über Albrechtgasse: entlang alter Stadtmauer bzw. Kreuzhof

MONASTERY CREATIVE

→ Zugang über Neutorgasse-Kirche und Franziskanerplatz-Kreuzgang

SACRED ROOMS

Gebäudeanlage mit Kirche, Jakobikapelle, Oratorium, Kreuzhof, Kreuzgang - „Ort der Stille“
→ Zugang über Neutorgasse-Kirche und Franziskanerplatz-Kreuzgang

FREE MEALS, NIGHT SHELTER

Raumumbau mit flexibler Doppelnutzung neben Haupteingang und Pforte: Umbau
→ Zugang über Franziskanerplatz

MONASTERY GATE SHOP and INFORMATION

Umbau der Pforte im flexiblen Bereich: Sekretariat, „Schnelle Seelsorge“, Empfang, Information
→ Zugang über Franziskanerplatz

SOCIAL WELFARE

Soziale Einrichtung z.B. für Behinderte oder Kinder, Ärztberatungszentrum, Integrationswerkstätte, kulturübergreifende Einrichtung, Beratung im Neubau Albrechtgasse
→ Zugang über Albrechtgasse



LIVING HISTORY

Anlage mit hist. Stadtgraben, Turm und zu sanierendem hist. wertvollen Klostergebäude - moderne Architektur.
→ Zugang über Franziskanerplatz Kreuzgang bzw. Albrechtgasse

Source: Arch. DI Lingenhölle and Franciscans Graz

4. BUILDING ENVELOPE

Roof construction :

plasterboard	15 mm
CD-profile between	
KeKelit cooling/heating element	30mm
lathing	35 mm
transverse lathing	100 mm
rafters with insulation	160 mm
wooden base planking	24 mm
roofing membrane	
counterlathing	50 mm
lathing	35 mm
roof brick	

Total 474 mm

Wall construction :

brick	700 mm
levelling layer	
lathing	60 mm
Hook profile	10 mm
flat-plate collector	105 mm

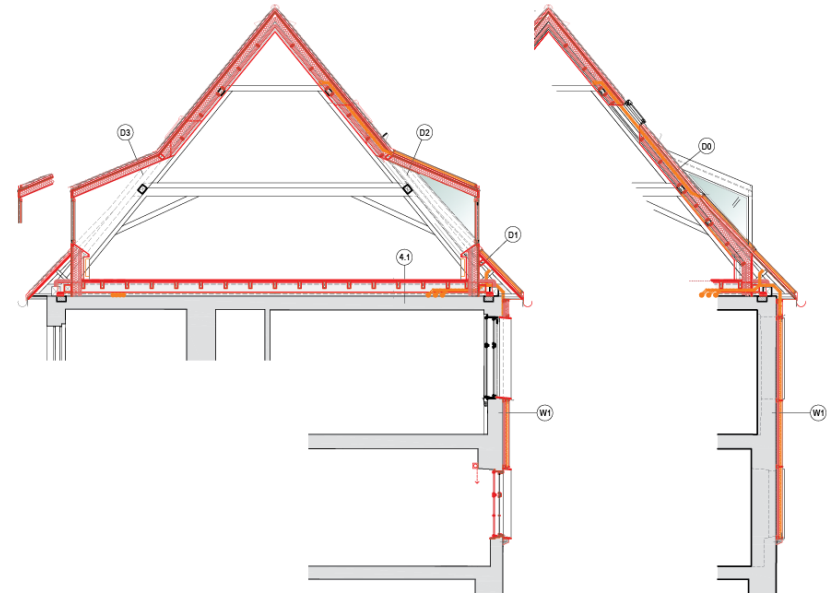
Total 875 mm

Summary of U-values [W/m²K]

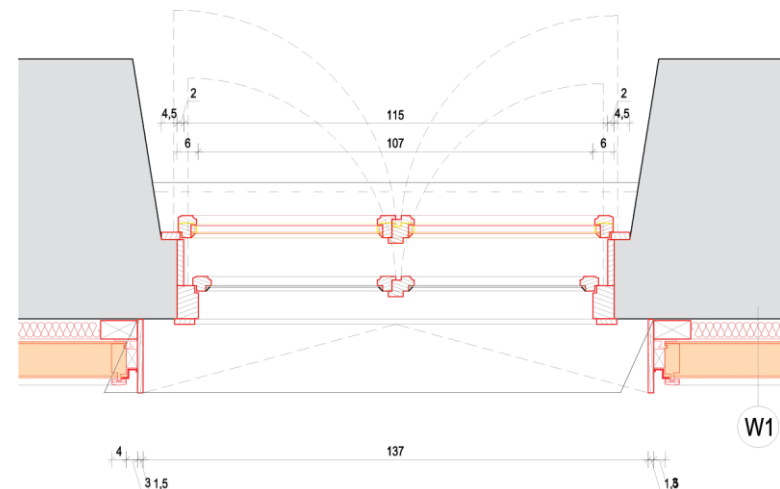
	Before	After
Roof/attic	-	
Floor/slab	0,77	
Walls	1,05	
Ceilings	2,08	
Windows	2,54	



Exterior view south wing



South wing Section and detail (new solar collectors red) (HoG architektur ZT GmbH)



5. BUILDING SERVICES SYSTEM

OVERALL DESIGN STRATEGY

conservation and preservation of the Creation

HEATING SYSTEM

Exchange of high-temperature system to low temperature system (component heating and radiators with individual room thermostat control)

COOLING SYSTEM

No cooling system

VENTILATION

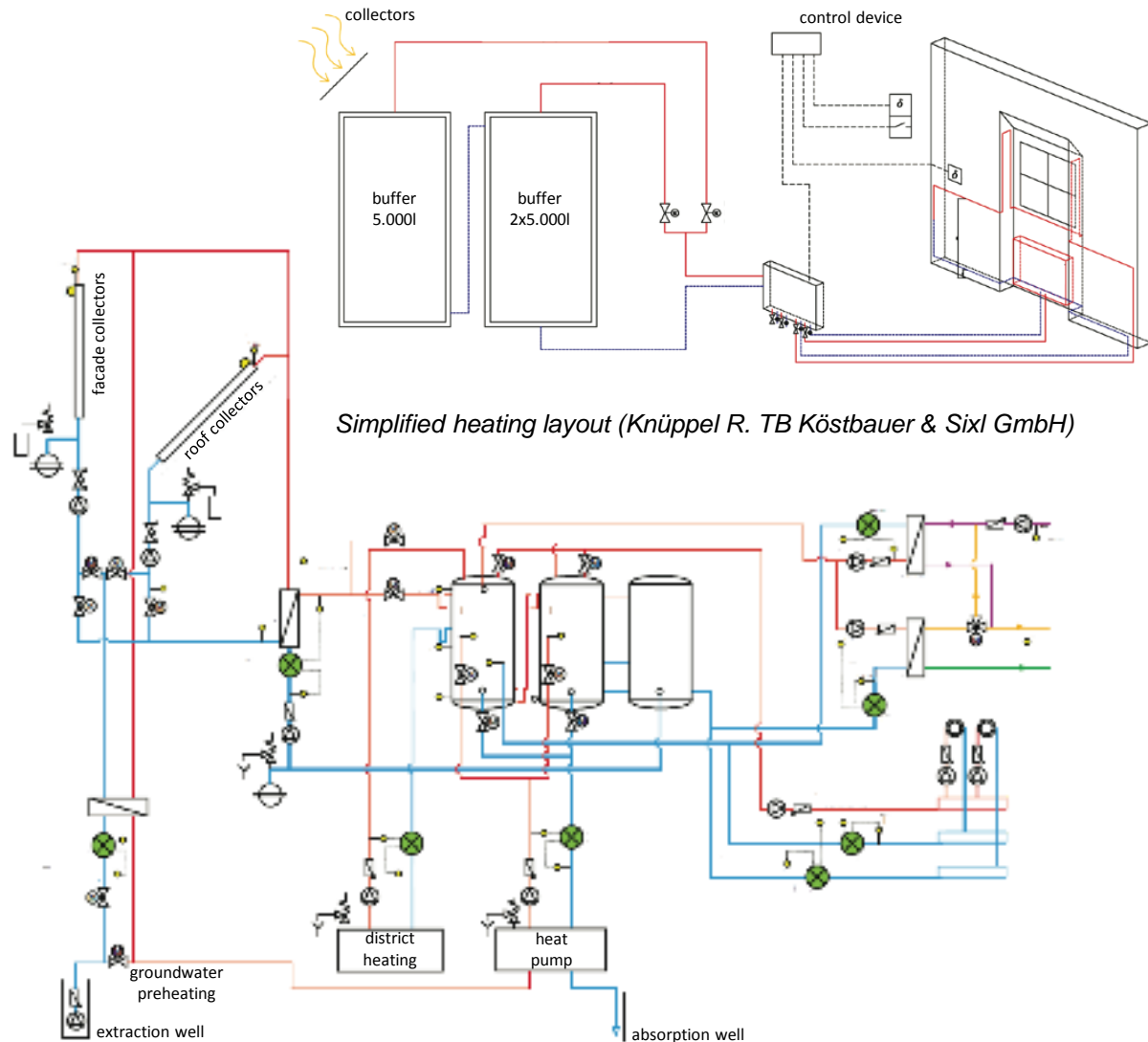
Ventilation system in the event room

HOT WATER PRODUCTION

Solar plant and heat pump, district heating as backup

RENEWABLE ENERGY SYSTEMS

*2 water heat pumps with 200 kW (well water fed),
On the south wing : 180 m² roof-integrated flat-plate collectors and 180 m² façade panels installed (for water heating, component heating and preheat the well water for the heat pump)*



Simplified heating layout (Knüppel R. TB Köstbauer & Sixl GmbH)

Hydraulic system Franciscan Monastery (Knüppel R. TB Köstbauer & Sixl GmbH)

6. ENERGY PERFORMANCES

1. Step: Energy efficiency measures

- Desiccation of the walls
- Insulation where possible
- Rooms used as buffers
- Renovation of box-type windows
- „Warming“ tints

Savings after the first step up to 25%!

2. Step: Solar thermal energy use

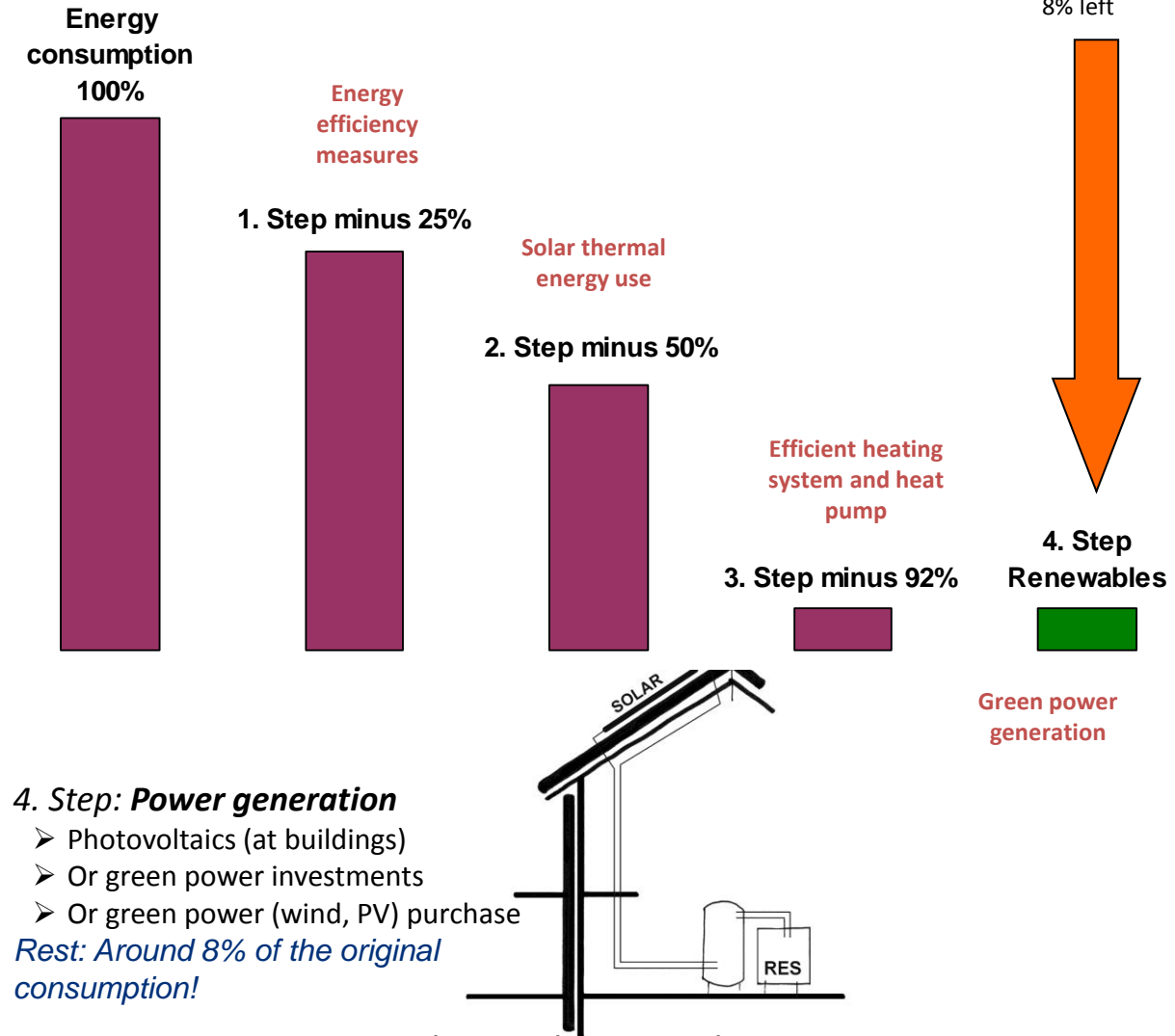
- For hot water and heating
- Component heating (to dry and pre-temperate the walls)
- Low temperature heating
- Supply of adjacent buildings

Savings after the second step up to 50%

3. Step: Heating system, heat pump

- Solar- and water-coupled heat pump
- Annual use efficiency > 5
- 3 storage tanks with together 15 m³
- Central heating room *inside* the building
- Two pipes distribution (flow/return flow)
- Three decentralized tiled stoves

Savings after the third step up to 92%!



„Insulation where it makes sense, measures with as low technical input as possible“

Br. Matthias Maier – Guardian of the Franciscan Monastery Graz



The energy performance certificate was calculated as good as possible for such historic buildings with the following results:

	before retrofit	after retrofit
Gross floor area	3,590 m ²	3,585 m ²
A/V-ratio	0.53 /m	0.36 /m
Energy performance	198 kWh/m ² a	85.38 kWh/m ² a
Energy demand heating	711,307 kWh	329,744 kWh
Heating load	256,4 kW	142,4 kW

*Table: Values calculated with HDT = 3,588 Kd and min. outside temperature –10,5 °C before and after retrofit
(Source: TB Köstenbauer und Sixl GmbH)*

Please note: a detailed calculation method for historic buildings is still missing.



Foam glass insulation in the hallways. Source: AEE Intec

EXTENDED SPACE THROUGH ATTIC CONVERSION



Roof extension, source AEE Intec



© A. Gebetsroither

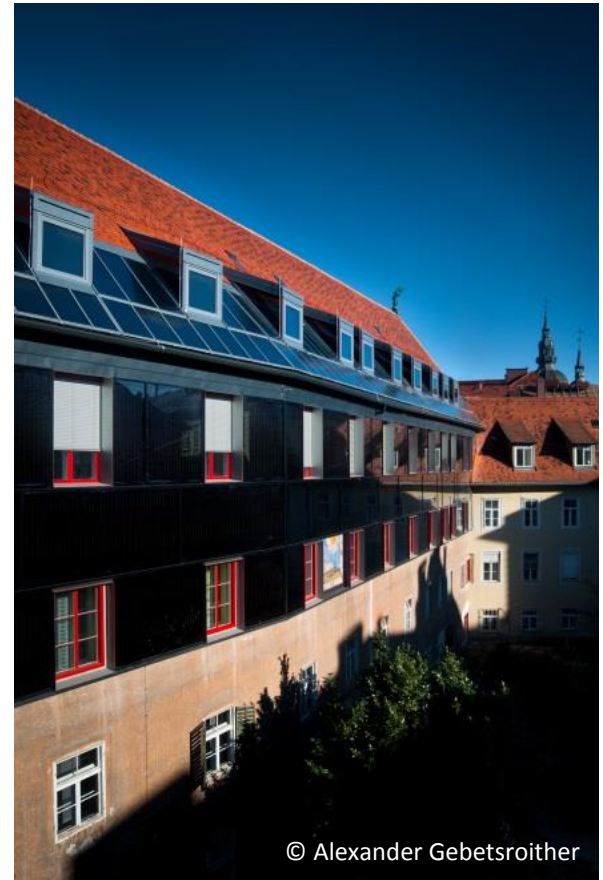


© A. Gebetsroither

Roof extension, source Alexander Gebetsroither



© Alexander Gebetsroither



© Alexander Gebetsroither