1. INTRODUCTION

Administration building Bruck/Mur – District Court and Fiscal Office

PROJECT SUMMARY

Year of construction: 1964
Past energy renovations: partially changed windows in the wing of the fiscal office in 2006

SPECIAL FEATURES

Main topics in the renovation:
* *improved functionality*
* *additional surface area*
* *challenging energy efficiency*
* *sustainability targets*

Innovative features:
* *special façade*
* *innovative HVAC (ventilation system, bivalent heat pump)*
* *lighting concept*

ARCHITECT: Pittino & Ortner
OWNER: Austrian Real Estate (affiliated company of BIG Bundesimmobiliengesellschaft)
Consultant: e7, Vienna
Partners: Grazer Energieagentur

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2. CONTEXT AND BACKGROUND

BACKGROUND

- *Building in T-form*
- *3 floors (wing district court), 5 floors (wing fiscal office)*
- *Mixture of public users: district court, fiscal office, governmental verification office*
- *Different ministries pay the rent*

OBJECTIVES OF THE RENOVATION

- *Improved functionality*
- *Additional surface area for district court*
- *Clear separation of district court from the rest of the administration building*
- *Challenging energy efficiency and sustainability targets*

SUMMARY OF THE RENOVATION

Innovative technologies:

- *Prefabricated metal cladding panels with solar 'honeycombs' for passive solar exploitation*
- *Ventilation with highly efficient heat recovery in the wing of the district court;*
- *Bivalent heat pump with a deep drilling system for cooling and part of heating;*
- *Lighting by presence and daylight dependent controlled floor lamps.*

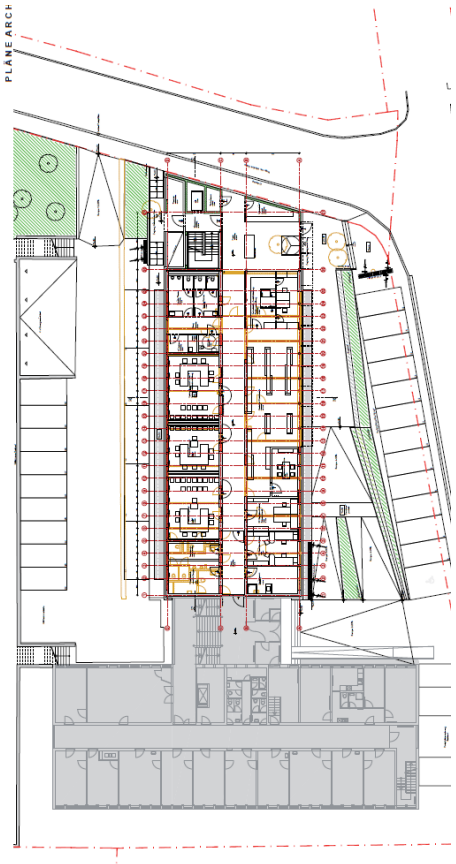
***Integrated Energy Design** approach including accompanying LCCA throughout the whole process*

***Percentage reduction in primary energy consumption**: about 60% (but also higher comfort levels)*

Façade before and

during resp. after renovation

- *Typical floor plan*



3. DECISION MAKING PROCESSES

- *2004 Ministry of Justice needs more space for the district court*
- *2007–2008 Study on the renovation and extension of the district court*
- *2009 Decision to realize a pilot project of the whole building including all three public stakeholders (district court, Ministry of Finance and BEV)*
- *2009 Start of research project within 'Building of Tomorrow': Decision to realize this building as a demonstration project*
- *From standard renovation level to high performance renovation standard of the project BIGMODERN*
- *International architectural competition in two steps:*
  1) Call for Application, Description of the capabilities of the office (11 applicants)
  2) Architectural Competition with 5 remaining studios
- *Definition of precise energy efficiency and sustainability targets for the winning architect*
- *Analysis of life-cycle costs in order to find cost-optimal solutions*

Entrance of the district court: outside (being closed, see above) and hall inside (below)

Timeline for the decision making process

Idea was born
2004

First brief project description completed
05.2008

Contract with general planner
08.2009

Detailed project description completed
12.2009

Tendering process started
01.2010

Start renovation
05.05.2011

Renovation completed
25.09.2012

Evaluation among occupants
2013 - 2014

4. BUILDING ENVELOPE

Roof construction: *U-value: 0,112 W/m².K*

Materials . (Interior to exterior):

Thermoplastic roofing membrane	*4 mm*
Rock wool insulation	*320 mm*
Moisture barrier	*0,4 mm*
Ferroconcrete	*200 mm*
Total	*524 mm*

Wall construction: *U-value: 0,155 W/m².K*

Materials . (Interior to exterior):

Chalk-cement plastering	*20 mm*
Concrete brick	*205 mm*
Chalk-cement plastering	*20 mm*
Rock wool insulation	*200 mm*
Air space (solar comb façade)	*4 mm*
Glass (solar comb façade)	*5 mm*
Total	*454 mm*

Windows: *U-value: ø 1,20 W/m².K*

Materials . (Interior to exterior):

Frame: aluminum

Window: 2 layers of glass

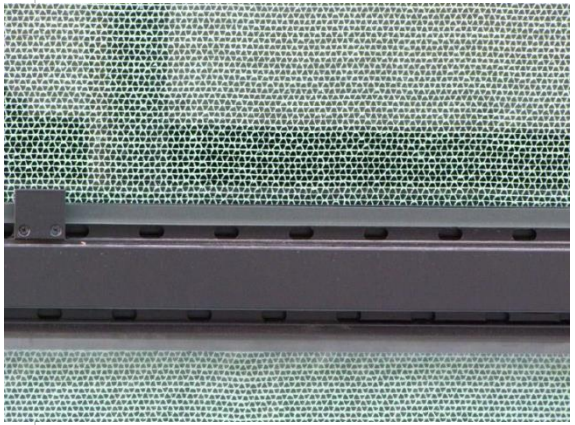
Sun-blinds in between the glass layers

Summary of U-values [W/m²K]

	Before	After
Roof/attic	1,05	0,112
Floor/slab	1,06	1,063
Walls	2,11	0,155
Ceilings	0,91	0,188
Windows	2,50	ø 1,20

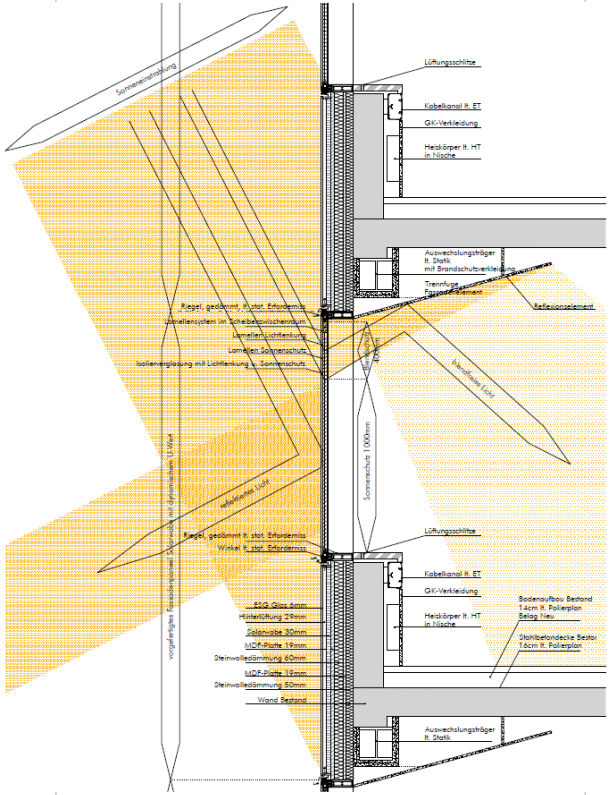
Pictures/figures

- *Solar comb facade*



Sections

- *Cross section of wall and window*



5. BUILDING SERVICES SYSTEM

OVERALL DESIGN STRATEGY
Two different types of renovation for the different wings

LIGHTING SYSTEM
Floor lamp, daylight and attendance control

HEATING SYSTEM
- *Before: Gas boiler*
- *After: District heating based on biomass*

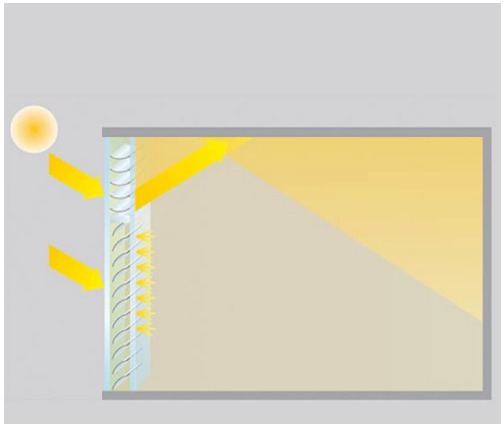
COOLING SYSTEM
- *Before: no cooling system*
- *After: heat pump with deep drillings for court rooms; passive cooling for administration rooms*

VENTILATION
- *Before: no ventilation*
- *After: Semi-central ventilation unit with heat recovery for every floor*

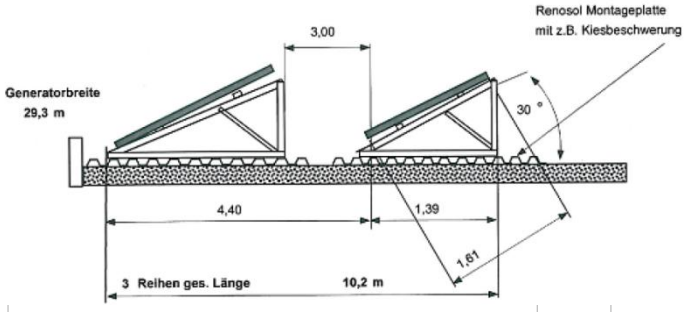
HOT WATER PRODUCTION
- *Before: central gas boiler*
- *After: decentralized electric boilers*

RENEWABLE ENERGY SYSTEMS
- *Before: no renewables*
- *After: 140 m² photovoltaic modules on the roof; heating based on renewables (district heating)*

- *Concept sun blinds and daylight*



- *Concept PV panels: 140 m² on the roof*



- *Concept lighting system: Floor lighting with daylight and attendance control*

6. ENERGY PERFORMANCE

REDUCTION HEATING DEMAND

The heating demand of the building could be reduced by 85% from 153 kWh/m²a to about 24 kWh/m²a. Due to the different refurbishment measures taken, the energy certificates have been drawn up separately for each wing (district court and fiscal office).

REDUCTION PRIMARY ENERGY DEMAND

Even though comfort and convenience in use could be increased significantly – and therefore additional energy flows for ventilation and cooling occurred – the primary energy demand could be reduced by approximately 65%.

REDUCTION CO_2

Due to the reduction of the energy demand and the replacement of the heating system by biomass district heating, CO_2-emissions could be reduced by approximately 75%.

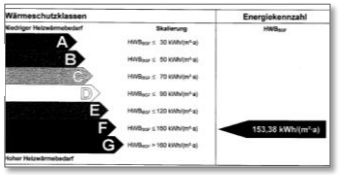
SYNOPSIS

The building was expanded by 853 m². In addition, a cooling system for the court rooms as well as a ventilation of the district court were installed. Despite this extension and the significant increase of comfort levels, a considerable reduction of energy demand could be achieved.

HEATING ENERGY DEMAND

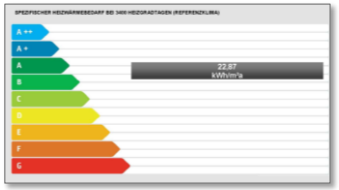
Existing building

whole building

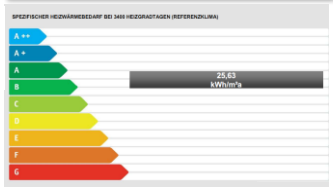


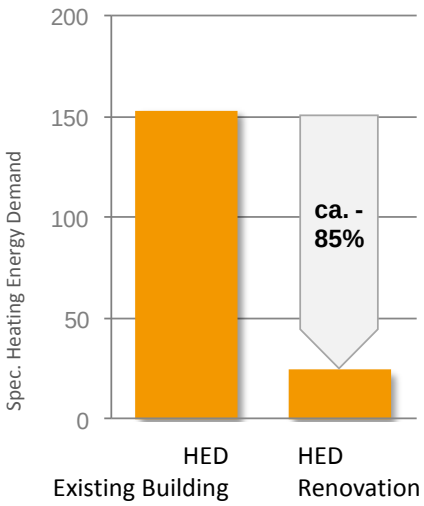
Renovated building

District court

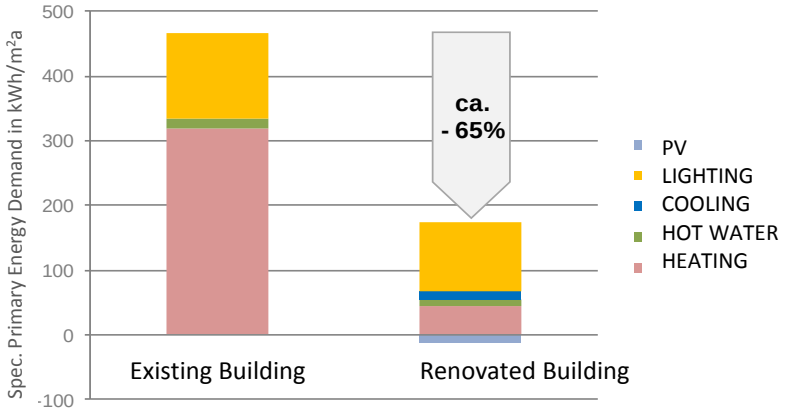


Ministry of Finance /BEV





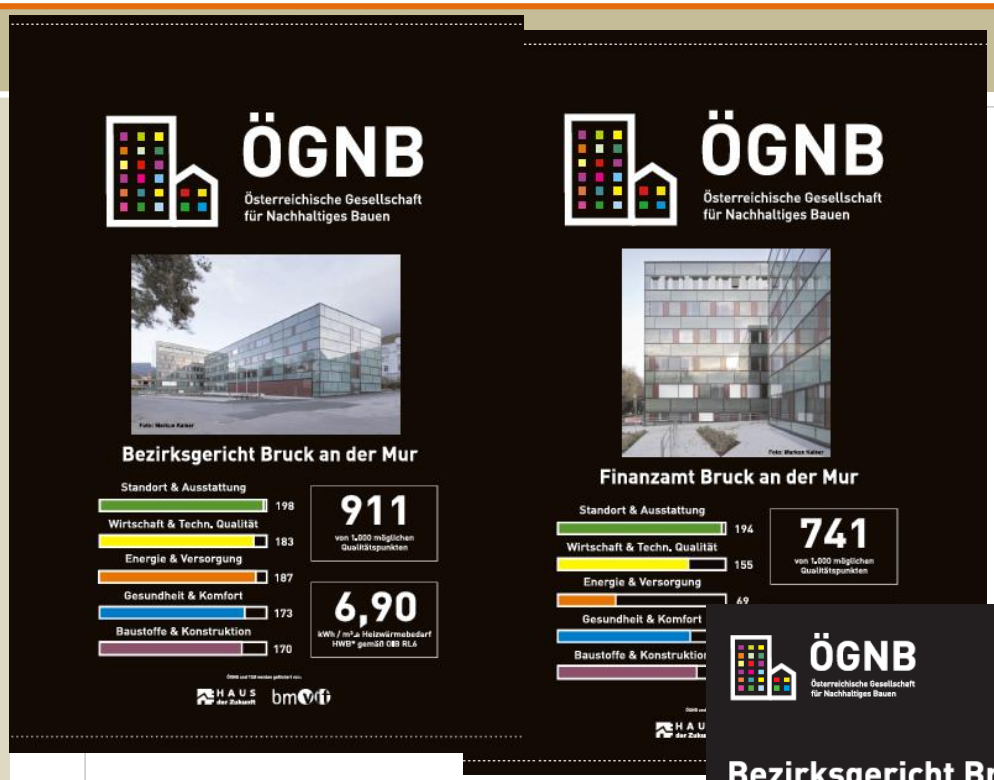
PRIMARY ENERGY DEMAND



CLARIFICATION: the energy calculations and given energy numbers will be according to the national standards which might vary between countries., i.e. numbers are not always comparable

7. ENVIRONMENTAL PERFORMANCE

- The building has received the Total-Quality-Building (TQB) certificate, which is the sustainability certificate of the Austrian Sustainable Building Council (ÖGNB – www.oegnb.net)
- The certificate is different for the two building wings
- Wing of district court:
  911 points of max. 1.000 points
- Wing of fiscal office:
  741 points of max. 1.000 points
- The sustainability performance according to TQB is among the front-runners of refurbishment projects in Austria
- In addition, the building (district court) holds the climate protection certificate “klima:aktiv Gold”



8 MORE INFORMATION

USER FRIENDLY DESIGN
Light colors and glassed areas are used in the interior of the building and make it user-friendly for the working staff as well as for clients.

OUTDOOR DESIGN
The public space in front of the building has been equipped with seating accommodations and green spaces.

Interior of the district court (Photos by Markus Kaiser)