

## Rectory in Ulm-Böfingen DE

### PROJECT SUMMARY

Overall retrofitting of the building envelope and the building technical equipment.  
53% reduction of net heating demand

### SPECIAL FEATURES

Solar collectors + HVAC  
Vacuum insulation panels  
Balcony incorporated in living space  
Single room heating control

### ARCHITECT

Günther Hermann Architects

### OWNER

Diocese Rottenburg-Stuttgart



IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation

Before



After

## BACKGROUND

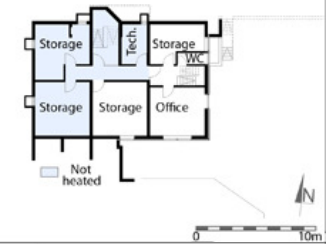
Over 90% of all building projects for the diocese Rottenburg-Stuttgart are for renovating existing buildings. The annual investment is about 40 million Euros. A motivation for retrofitting the community centre “Zum Guten Hirten” was to show what the church can do to help protect the environment. A target was to at least halve the energy consumption, while keeping within financial means. Three buildings on the site were to be renovated: the community hall, the kindergarten with apartments and the rectory with offices. A prerequisite was that community hall's exterior appearance could not be altered. In view of the many different functions and times of usage in the rooms an easy-to-use room temperature control system was a requirement.

The project was sponsored by the German Federal Ministry of Economy and Technology.

## SUMMARY OF THE RENOVATION

- Balconies were enclosed to extend the rooms.
- 2.2 m<sup>2</sup> solar collectors added for heating DHW.
- Windows were replaced (U-value 1.07 W/m<sup>2</sup>K).
- Insulation of north, west and east facades with 3 cm vacuum insulation panels.
- Single room heating control.
- Exhaust and supply HVAC with heat recovery.

Ground floor



First floor



Second floor



Section





Connection details: New facade

## CONSTRUCTION

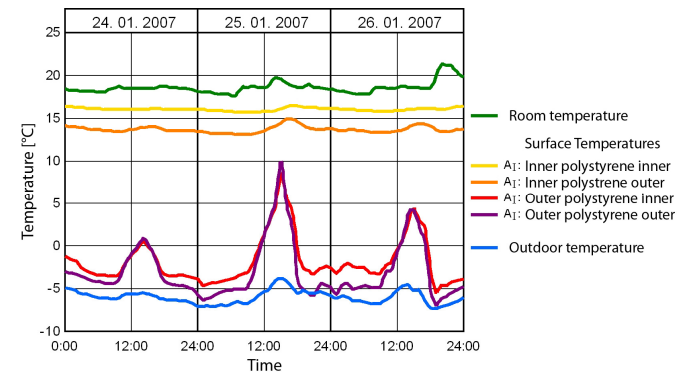
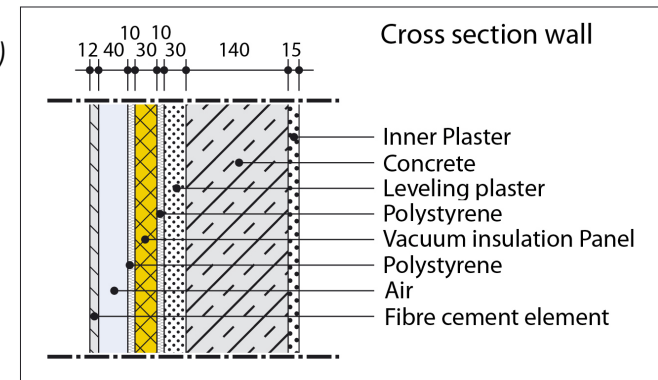
### Wall construction (N / W / E) (U-value: 0.28 W/(m<sup>2</sup>·K)

(interior to exterior)

Gypsum plaster	15 mm
Concrete	140 mm
Plaster	30 mm
Polystyrene	10 mm
Vacuum insulation panel	30 mm
Polystyrene	10 mm
Air	40 mm
Fibre cement board	12 mm

Total 287 mm

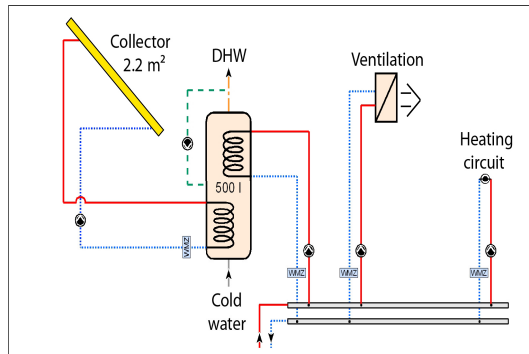
Building element	U-Value [W/m <sup>2</sup> ·K]		Measure taken
	Before retrofit	After retrofit	
Exterior wall 1 Ground floor and 1st	0.55	0.28	3 cm Vacuum insulation panel
Exterior wall 2 Stair house ground fl.	1.71	0.34	8 cm insulation
Flat roof	0.57	0.17	22 cm from 6 cm Insulation
Floor 1 1st to Cellar	0.82	0.35	6,5 cm Insulation
Floor 2a Ground to Earth	0.96	0.48	7 cm from 3 cm Insulation
Windows	2.50	1.07	Triple thermal glazing



Temperature over the wall on the west side of the building in the period from Jan 24, 2007 – Jan 27, 2007



## HEATING SCHEME



## ENERGY PERFORMANCE TOTALS\*

Period	End Energy	Primary Energy
	kWh/m²a	kWh/m²a
Before	140.2	127.5
2006	85.1	73.8
2007	78.9	83.8

## RENEWABLE ENERGY USE

Solar collectors ( 2.2 m² ) roof.

\* PV system for the three buildings have not been taken into account. (gains during 2006: 58000 kWh, 2007: 63400 kWh)

## INFORMATION SOURCES

Reiss, J.; Erhorn, H.: Energetische Verbesserung der Bausubstanz, Teilkonzept 3: Messtechnische Validierung der Sanierung eines Gemeindezentrums unter Einsatz von Vakuumdämmpaneelen. IBP report WB 140/2008. <http://archiv.ensan.de>

### Brochure author

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Pre-packing vacuum pack panels in polystyrene

## ENERGY PERFORMANCE (CONSUMPTION)

Period	Description	Primary energy factor	End Energy	Primary Energy
			[kWh/m²a]	[kWh/m²a]
Before retrofit	Heating demand	0.78	111.2	86.6
	DHW		19.5	15.2
	Electric power	Pumps	1.7	4.6
		Ventilation	0	0
Light etc.		7.8	21.1	
2006	Heating demand	0.31	56.7	17.6
	DHW		8.5	2.6
	Electric power	Pumps	2.1	5.7
		Ventilation	4.2	11.2
Light etc.		13.6	36.7	
2007	Heating demand	0.31	48.2	14.9
	DHW		4.9	1.5
	Electric power	Pumps	1.9	5.0
		Ventilation	4.5	12.1
Light etc.		18.6	50.3	

## BUILDING SERVICES

The building is still supplied with district heat. Radiators were replaced on the south facade. Pumps were replaced with differential pressure controlled pumps. The room temperatures are individually controlled and the radiator valves have been connected to window contacts (when windows opened, valve closes). Solar collectors for heating domestic water were installed on the roof. An exhaust and supply HVAC system has been installed with a coil hot water heat exchanger in the fresh air supply after the HVAC.