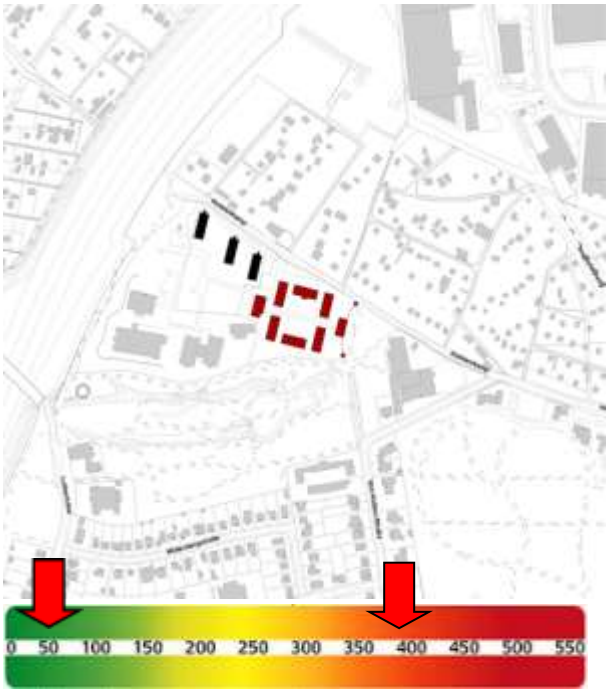
Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument)

Pilot project ‘Holstenkamp’, Hamburg

GERMANY

1 Project description

The building is a former old people´s home situated in Hamburg-Altona. The ensemble consists of 8 brick buildings which are symmetrically arranged around a green park area. Two of the buildings are two storied and have a hip roof, the rest of the buildings are single storied with a hip roof. The buildings are in a good technical condition and under heritage protection.



Adress: Holstenkamp 119, Hamburg

Building type: old peoples home

Architect: unknown

Year of construction: 1922-23

Owner: joint building venture “Hütten und Paläste”

Used as: residential building

Number of floors: 2 to 3

Façade: brick

Floor space: 3,900 m²

Heated area: 3,300 m²

Cost of refurbishment: 173,600 €

Refurbishment
Start: March 2013
End: October 2014
Architect: Heyden und Hidde, Hamburg

Material
Façade: brick and sand-lime brick

Roof: clay tiles

Windows: wood in facade, aluminum/ wood in roof

Shading system: sun protection glazing, canopy or jalousie

Floor/Ceiling: concrete, wood

Inner Walls: sand-lime brick

Cellar: brick and sand-lime brick

Foundation: brick

2 Initial situation

Before the refurbishment the building had been empty for some years and prior to that it had been used as a residential accommodation for difficult-to-educate teenagers. The City of Hamburg owned the land and the buildings and wanted them to be used by a building community. In a selection process between several competing building communities one was selected and is now implementing and financing the refurbishment.

3 Possible technical solutions

The following measures were regarded as generally speaking possible in this specific building:

- Walls: Internal insulation of the outer wall with capillary active material
- Floors: Insulation of the under surface of the floor
- Roofs: Insulation of either the top floor or common rafter insulation
- Doors: The original ones still existed but because they were in a very bad state it was allowed to replace them.
- Windows: They were not original anymore, therefore exchanged with more energy efficient ones, made from the original material wood and with the original division by glazing bars
- Heating system: Replacement with a new heating system, but no solar panels on the roof
- Mechanical ventilation system: A ventilation system that uses the existing chimneys, no core boring into the outer walls would have been allowed
- Electric system: Will be renewed completely because it is not original anymore

Heating system / -production

Old: probably oil

New: combined heat and power generation with natural gas

Building services

Electricity: all new

Building automation: heating control, ventilation with heat recovery

Water: normal supply by network

Waste water: leeching cesspool

Energy consumption:

Before, calculated: 387 kwh/m²/a

After, calculated: 48 kwh/m²/a

Energy saving: 86%

4 Motivation to select the specific measures

Within Co_2olBricks three houses were equipped with wall heating systems and internal capillary active insulation while the other 5 houses will be equipped with convector heating and an internal capillary active insulation. Because the inner sides of the walls are not of heritage value, it was possible to apply internal insulation and a wall heating.

The internal insulation and the wall heating were chosen because it was not possible to install an external insulation. The wall heating was chosen because of its better comfort-parameters and also in order to compare the energy effects of the wall heating with the ones of a convector heating. The advantage of the houses is that they are very similar so that a good comparison between them is possible.

In two units, one with wall heating and one with convector heating, indoor and outdoor temperature and humidity at several points in the construction and the heat flow will be monitored.

5 Planned measures

- Floors: 14–16 cm Polystyrol insulation, U-value 0.35–0.38 W/m²K
- Walls: In three buildings 3 cm Klimasan insulation plaster, U-value: 0.078 W/m²K; in the other buildings 5 cm Ytong Multipor, U-Value: 0.045 W/m²K
- Roofs: 24 cm Mineral and fiber insulation material, U-Value: 0.035 W/m²K
- Windows: Double-glazing insulation, U-value 1.26–1.99 W/m²K
- Doors: New Doors U-value 1.3–1.8 W/m²K
- Heating system: In building 3, 5 and 8 wall heating systems, in the rest of the buildings (1, 2, 4, 6 and 7) convector heating
- Energy supply: District heating, primary-energy factor 0.67
- Hot water: District heating, primary-energy factor 0.67
- Shading system: Inner shading system for most of the windows in the walls and outer shading system for the roof windows and some windows in the walls

6 Costs & financing

1. Costs	**total costs** (in €)
Insulation of roof, etc.:	21,000
Insulation of soffit with Calcium Silicate:	4,600
Closing of slots in wall:	900
Doors and windows:	54,000
New cellar doors:	700
New cellar windows:	1,300
Solar shielding:	1,000
Wall insulation with 3 cm insulation plaster:	32,000
Wall heating system and other heating devices incl. pipes, etc.:	35,000
sum 1	Net 145,900 Gross 173,621

2. Financing	**funding sum** (in €)	**internal rate of return, interest rate** (in %)
Own money		
Bank credit		
Public funding		
Donations (BSR programme)		
sum 2		

3. Amortisation			
Heating cost <u>before</u> refurbishment	**energy use p.a.** (in kwh)	**cost per kwh** (in €)	**total cost p.a.** (in €)
Gas	-	-	-
Oil	202,401	0.0851	gross 17,224
Electricity	-	-	-

Heating cost <u>after</u> refurbishment	**energy use p.a.** (in kwh) (estimated)	**cost per kwh** (estimated)	**total cost p.a.** (estimated)
Gas	-	-	-
Oil	-	0,2178	-
Electricity	-	-	-
Local district heating	25,104	0.0615	Gross 1,543
Payback period for the refurbishment	**cost savings** p.a. in €	**amortisation period** (in years)	
	Gross 15,681	**11**	

Additional information:

- The energy consumption before and after is calculated, not measured, because there are no data available so far
- The building is still under construction