ROW - Albertslund, DK

Bjørnens Kvarter 15C og 15D

PROJECT SUMMARY
Renovation and additional insulation of roof, facades and floor. New bay windows, bathrooms, kitchens and interior surfaces. Designed per Danish low energy class 2 (63,3 kWh/m² a for a 120 m² house).

SPECIAL FEATURES
Solar panels for domestic hot water and mechanical ventilation with heat recovery

ARCHITECT
Nova5 architects, DK

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Niras Consulting Engineers, DK

OWNER
BoVest Housing Company, DK

Photo: NOVA5

SHC
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

IEA – SHC Task 37
Advanced Housing Renovation with Solar & Conservation

Before the renovation

House 15C – after the renovation

Photos : NOVA5

BACKGROUND

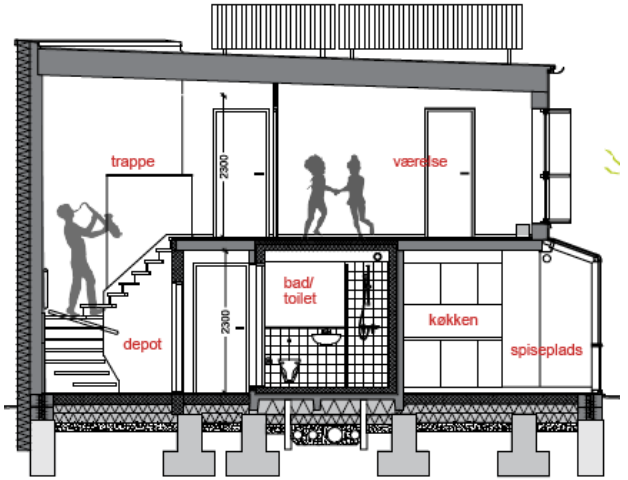
The houses in the residential area of Albertslund South were built in 1963-65 Among other types there are 550 terrace houses. These suffered from difficult to solve constructtion problems. Therefore, the owner, BoVest Housing Co. decided for a comprehensive renovation.

Due to a fire in two of the houses (Bjørnens Kvarter 15C og 15D), these were selected as exhibition units to demonstrate how the renovated houses would look.

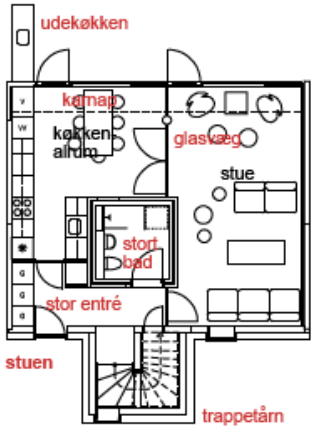
It is the aim that the houses are renovated to comply with the Danish standards for low energy class 2 (63.3 kWh/m² a for a house of 120m²). To meet this goal solar panels and mechanical ventilation with heat recovery were installed.

SUMMARY OF THE RENOVATION

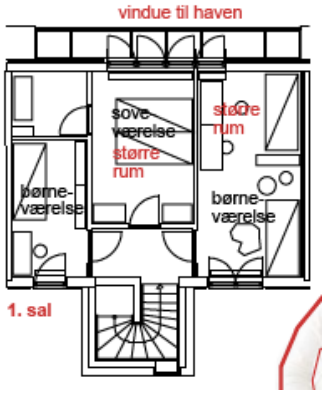
- New roof construction (prefabricated roof elements)
- Additional insulation of lightweight facades
- New windows and doors with triple glazing
- New kitchens and new bath rooms
- Mechanical ventilation with heat recovery
- Solar panels for domestic hot water and floor heating
- Mounting of prefabricated bay windows



Cross section



Ground floor



First floor

Drawings: NOVA5

From the entrance 15C - After Before

House 15D After – seen from the garden

Photos: BoVest

SOLAR HEATING

One of the houses has solar panels mounted on the roof. It contributes 11.4 kWh/m² a.

The panels are 5 m² and hot-water tank is 255 litre.

VENTILATION

The mechanical balanced ventilation system provides a constant airflow of 240 m³/h. It is located in a kitchen cupboard and includes an efficient counter-flow heat exchanger with 85-90% heat recovery.

Air is exhausted from the kitchen, bathroom and hallway. Fresh air is supplied to all bed rooms and the living room. Ducts are partially visible, partially above suspended ceilings and partly in the insulation layer in the ground deck.

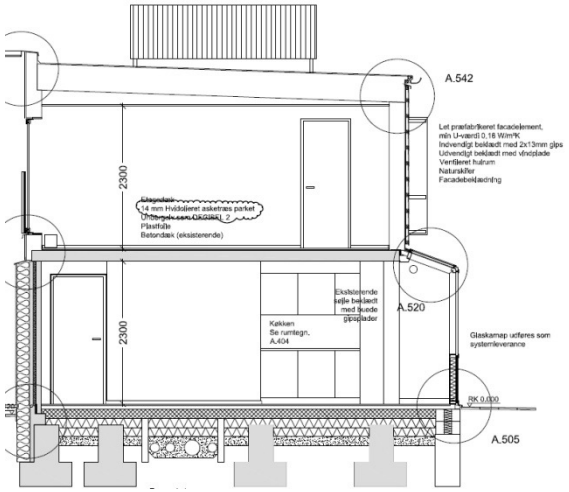
The specific fan power (SFP) for the entire ventilation system is 1.2 kJ/m³.

Solar panels - roof mounted. *Photo: NOVA5*

Bay window - seen from inside

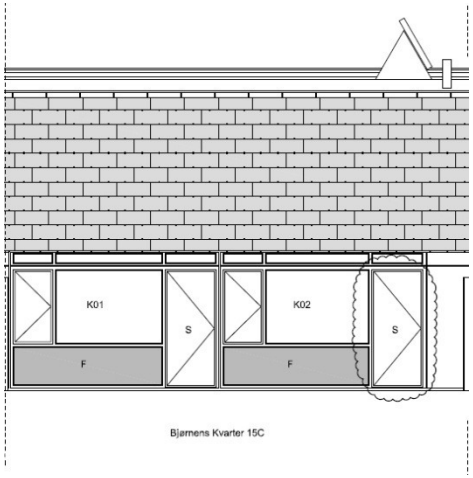
BAY WINDOWS

As part of the renovation bay windows were added to the row houses. This enlarges the indoor area and to creates better daylighting of the space.



Vertical cross section

Bay windows – seen from the garden



Elevation of facade (garden view)

Photos: BoVest

Drawings: NOVA5

Large glazing areas improve daylighting

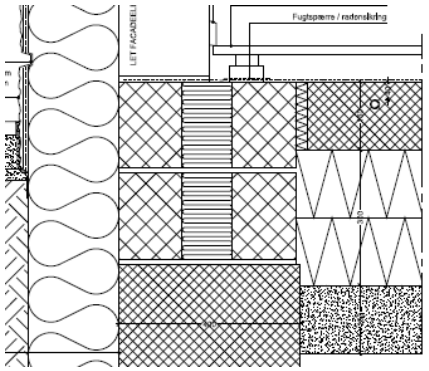
Photos: BoVest

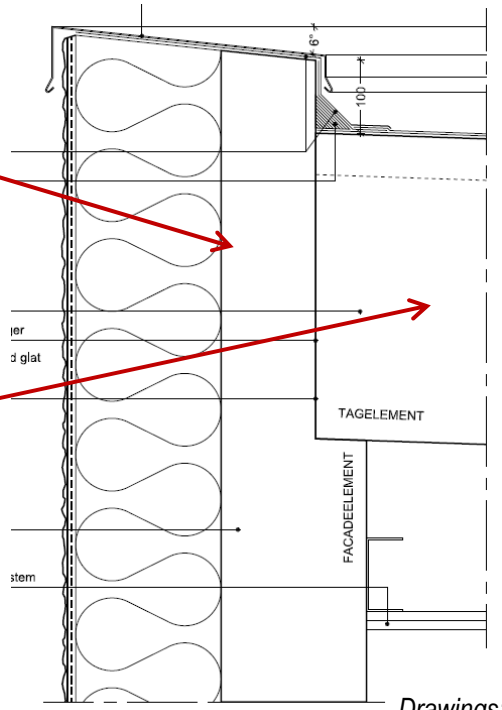
CONSTRUCTION

Floor	*U-value: 0.15 W/(m²·K)*
(interior to exterior)	
White oiled parquet (on joists)	22 mm
Joists	50 mm
Vapour barrier	
In-situ casted ground deck floor heating	150 mm
Rigid insulation	300 mm
Capillary break layer	150 mm
Total	672 mm

Wall	*U-value: 0.18 W/(m²·K)*
(interior to exterior)	
2 layer of plaster	24 mm
Vapour barrier	
Lightweight element	200 mm
Insulation	200 mm
Plastering	
Total	424 mm

Roof	*U-value: 0.12 W/(m²·K)*
(top down)	
Lightweight prefab. element:	
Asphalt roofing + air gap	45 mm
Insulated ridge construction	400 mm
Vapour barrier	
Suspended celing	200 mm
2 layers of plaster on steel section	24mm
Total	669 mm





Drawings: NOVA5

Photos: BoVest and NOVA5

Summary of U-values W/(m²·K)

	Before	After
Roof	0.19	0.12
Walls (lightweight)	0.36 - 0.45	0.18
Floor	0.60	0.15
Windows*	2.8	1.42

* the U-values vary from 1.02 to 1.85; the most commonly used windows have U-values of 1.42 W/m²K.

BUILDING SERVICES

The houses are situated in an area with district heating from the Albertslund Municipality: Its goal is to supply the residential neighbourhood with low temperature district heating. The houses will be equipped with radiators for low temperature heating. In house 15C solar panels will be used for heating of the hot water. In house15D a decentral water heater will be used.

RENEWABLE ENERGY USE

The future houses are all expected to have solar thermal collectors.

ENERGY PERFORMANCE

Space + water heating (primary energy)*
Before: 163.5 kWh/m² a
After: 40.4 kWh/m² a (house C)**
38.5 kWh/m² a (house D)
Reduction: 75% (C) and 76% (D)

The area used in the calculation is the total heated floor area (net m²).

*Conversion factor used for district heating: 0,77 (70% coal and 30% oil)

** Solar heating supplies the house with 11.4 kWh/m²/year

INFORMATION SOURCES

Housing Company BoVest - www.bo-vest.dk
Nova5 architects – www.nova5.dk
Niras Consulting Engineers - www.niras.dk

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