

Wijk van Morgen, Kerkrade



Project summary

The project consists of 153 social-rental dwellings, built in 1974, that have been renovated to Passive House standard. As a precondition the renovation has taken a mere 8 working days per house, due to replacement of the facades and roof by complete, pre-manufactured elements.

Solar energy plays an important role, in particular photovoltaics and solar thermal energy.

Energy concept: Passive House standard, balanced mechanical ventilation with high efficiency heat recovery, high efficiency condensing boiler, roof integrated PV and solar thermal collector



Renovated dwellings

Site: Wijk van Morgen, Kerkrade
Hagendorenstraat 2
NL 6460 AC Kerkrade

Owner: HEEMwonen
Erpostraat 1
NL 6460 AC Kerkrade

Architect: Teeken Beckers
Architecten bv
Hagendorenstraat 2
NL 6436 CS Amstenrade

Engineer WSM Heythuysen

Contact Person: Maurice Vincken, HEEMwonen

Important dates: Start of demonstration project: 2011
Completion of demonstration project: 21 December 2011
Start of the main project: June 2012
Completion of the main project: June 2013

Date completed: November 2013

Building description /typology

- Built 1974
- 70 apartments (two storeys)
- 83 single-family houses

Building envelope, heating, ventilation, cooling and lighting systems before the energy renovation

Description of building (building situation, building system, renovation needs and renovation options.

The houses are located in Kerkrade, a city at the Dutch-German border near Maastricht. They were built in 1974 as social rental houses, of which 70 apartments and 83 one-family houses. The party walls are load-bearing brickwork, the floors are concrete slab floors.



Heating, ventilation, cooling and lighting systems before retrofit

Also aspects of building technology, long-term maintenance, improvement of the living environment, and sustainability were taken into consideration when making the plans. In addition, the tenants were supposed to continue their livings in the house during the renovation. Consequently, a renovation technology was developed based on full replacement of the roof and façade elements by brand new, prefabricated elements, the roof elements having the solar photovoltaic and thermal systems integrated.



Building envelope

In the not renovated situation, the building envelop consists of two façade elements made of wood. The windows have single panes; there is no insulation and the houses have an individual gas fired central heating system. As the energy demand was high, but the basic construction and floor plans of the houses were quite sufficient, it was decided to renovate the houses to such a level that the social, economical and technical lifetime was extended with an additional 40 years.



The houses before renovation

Energy renovation features

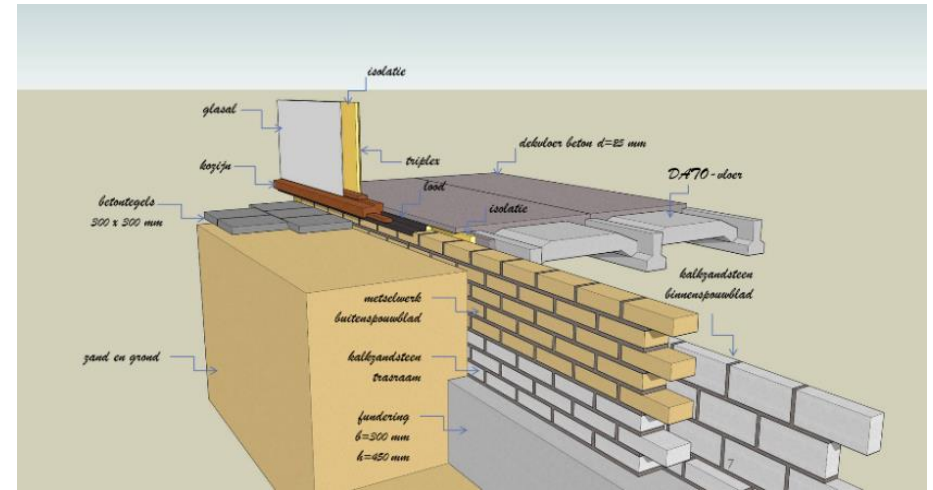
Energy saving concept

The building shell has been improved to passive house standard. The images at the right show the original construction of the walls, ground floor and foundation (before renovation) and the construction as it is after renovation.

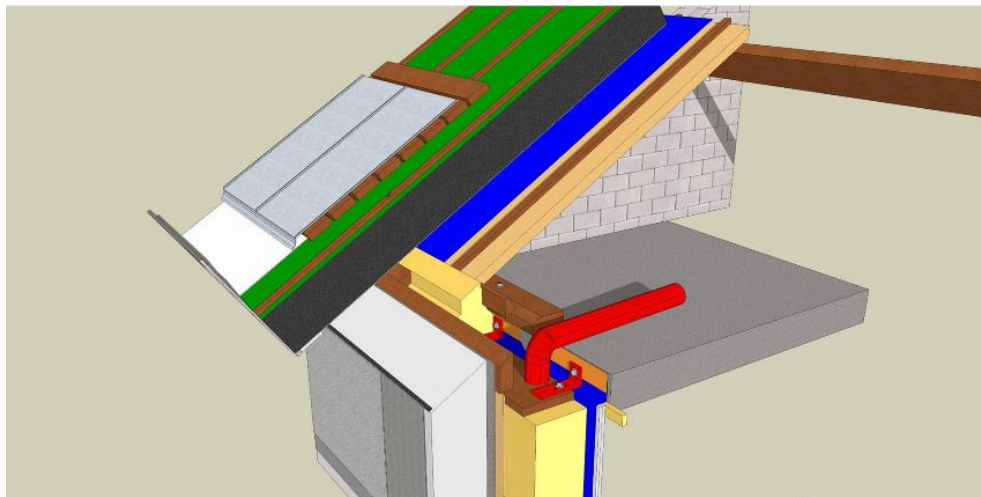
As usual with passive houses and passive house renovations, the houses have a balanced mechanical ventilation system with high efficiency heat recovery

Space heating and domestic hot water are provided by a high efficiency condensing boiler and a solar thermal collector.

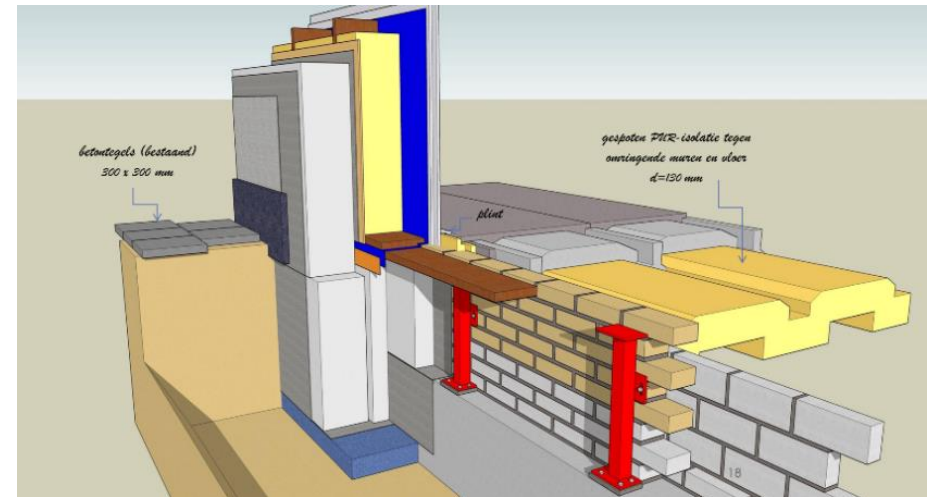
The houses have been provided with new roof elements, including prefab integrated solar collectors and photovoltaic modules



Wall-floor construction, before renovation



Roof-upper floor construction after renovation to passive house standard



Wall-floor construction after renovation to passive house standard

Achieved Energy Savings, CO2 reductions and Life Cycle Costs

Energy and cost savings from the renovation

Energy savings costs per Month:

Natural Gas: € 53
 Electricity: € 48
 Total savings: € 101

Rent increase per month:

Renovation: € 40
 Solar system: € 24
 Total: € 64

Net economical savings for the tenants per month:

Total: € 37



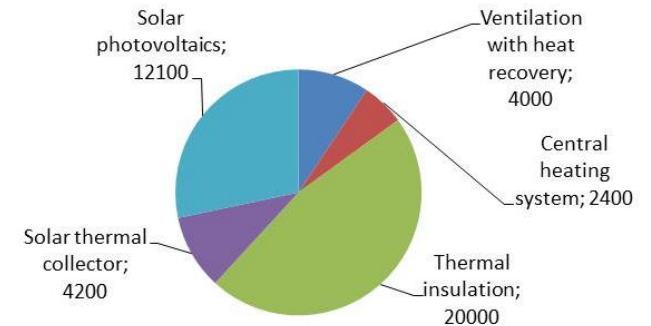
Building after renovation

Renovation costs

Energy related renovation costs per dwelling

Ventilation with heat recovery	€ 4.000
Central heating system	€ 2.400
Thermal insulation	€ 20.000
Solar thermal collector	€ 4.200
Solar photovoltaics	€ 12.100
Total	€ 42.700

Energy related renovation costs [€] per dwelling Total: € 42700



Overall improvements, experiences and lessons learned

The main goal of the renovation was to improve the energy standard of the house in such a way, that the living costs of the tenants do not increase, whilst the comfort and energy consumption of the house should be brought to the passive house standard, whereas the remaining "life time" of the houses should be extended to another fifty years. Furthermore, the inconveniences for the tenant during the renovation process should be as least as possible. Consequently, a concept has been developed for carrying out the renovation in a mere eight working days, with two extra days for cleaning up the building site. This concept has proven to be feasible.

Economic consequences for the tenants

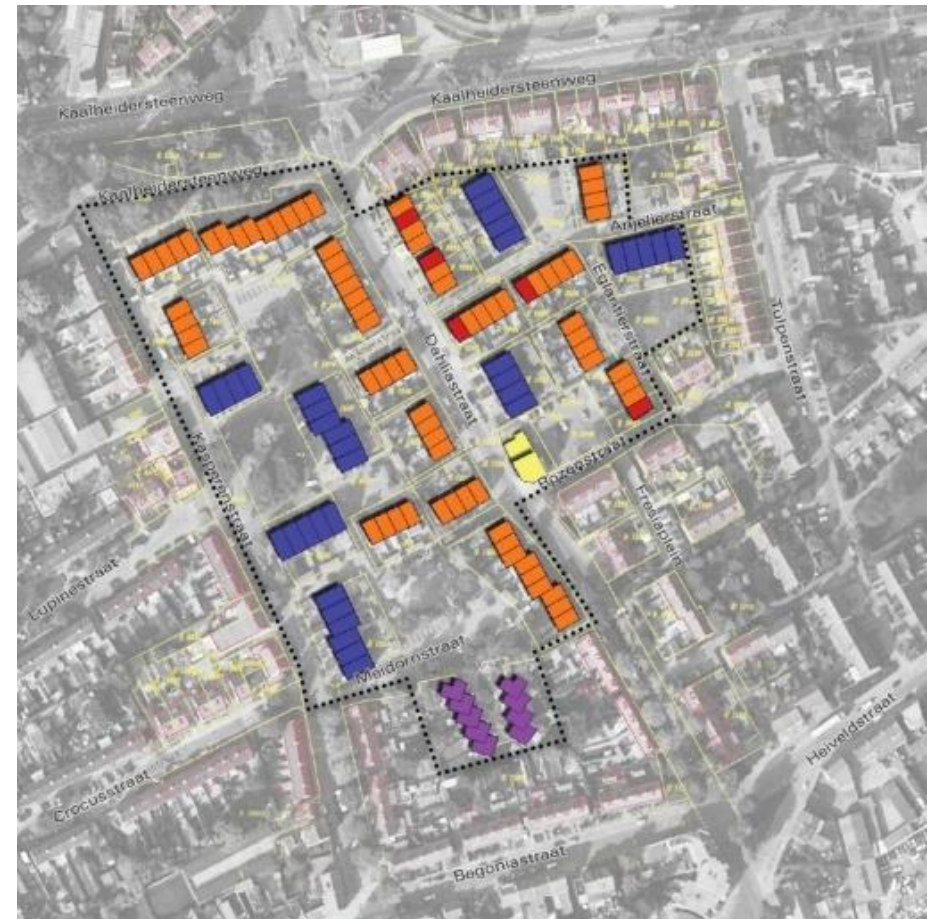
After renovation, the (calculated) net profit for the tenant should be € 37 per month (of course depending on the individual household energy consumption).

Lessons learned:

- success of the project is very much depending on the full support by the tenants and by the board of the housing association
- Participants in the process should learn to leave the common, well-known solutions and to think "out of the box" for new solutions of the problems.
- The project ambitions must be high and should not be weakened during the process.

Co-benefits

- The housing association has considerably enlarged the economical and technical "life time" of the housing complex
- The tenants have the advantage of lower living costs in a more comfortable house, as the savings on energy costs are higher than the rent increase
- The overall status of the area has improved.



General data

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Acknowledgements

HEEMWonen, Kerkrade
Platform31, Den Haag
EnergyGO, Alkmaar
BAM Woningbouw, Bunnik

References

- [1] www.westwint.nl
- [2] www.bamwoningbouw.nl
- [3] www.energiesprong.nl



Figure: The houses after completion