SINTEF

Report No - Unrestricted

Report

English summary: Energy concept for upgrading Nordre Gran housing cooperative

Renovation with Passive House components, focusing on energy-efficient water heating

Author(s)
Michael Klinski
Peter Schild, Bjørn-Roar Krog, Pål Harstad og Anna Svensson

SINTEF Building and Infrastructure
Energy and Architecture
2012-09-25

SINTEF Byggforsk has carried out a condition assessment of 7 blocks from the 1970s in Nordre Gran housing cooperative in Oslo. Based on this, an energy concept for upgrading was developed with a focus on energy efficient water heating. The background is a great need for facade rehabilitation and a high energy consumption for domestic hot water, which is far above the average for comparable blocks of flats. The studies were carried out within REBO, a four-year research program on sustainable upgrading of post-war housing blocks. REBO is funded by the Norwegian State Housing Bank Husbanken, and the Housing Bank also gave grants for the condition assessment as well as for the development of the energy concept.

The condition analysis i. a. conducted a questionnaire survey, resident interviews and measurements of air tightness. Moreover, the situation and potential of upgrading to universal design were analyzed. The results show very good air tightness with n_{50} values between 0.5 and 1.1 – which is far better than in most older and new residential blocks. At the same time, the survey showed that the more people who live in an apartment, the poorer the indoor climate experienced. The mechanical ventilation system with only exhaust fan can not ensure good air quality, especially in flats with many residents.

In the light of the condition assessment, there were considered various options for energy efficient upgrades. As a first step, measures to reduce net energy demand for space heating and hot water were investigated. Based on the reduced net energy demand, options for energy supply with efficient technical installations for water heating, space heating and ventilation were analyzed. On this basis it was proposed a concept including the following elements:
- 20 cm added insulation on the facade
- Passive House windows
- Measures to minimize thermal bridges (especially balconies and plinth)
- Added insulation on roofs and roof terraces
- Balanced ventilation with heat recovery
- Individual metering and invoicing of hot water consumption
- Time control of circulation pumps
- Water heaters with outside air to water heat pump
- Drying room dehumidifier
- Air to air heat pumps for space heating with shared outdoor unit (as an option).

It was carried out profitability calculations which show that the total monthly cost after upgrading with such ambitious measures will be lower than after more conventional and less ambitious rehabilitation. This does not include heating with air to air heat pump, which can only be profitable with relatively high electricity prices. Rehabilitation as proposed with balanced ventilation, will likely qualify for a high amount of grants from the Norwegian energy agency Enova.

Discussion and results

Residential building blocks that are very airtight even before rehabilitation, and which have less heat loss due to poor ventilation, may have less potential for energy saving, compared with e. g. projects like Myhrerenga. Nevertheless, measures to improve indoor air quality are particularly important in such homes. Upgrading with high ambitions can be profitable here, too, but margins may be small. The potential that lies in efficient energy supply, should be evaluated, utilized and viewed in the context of structural measures to obtain the best possible overall solution. Measures to improve indoor air quality can be essential in the argumentation since these involve higher comfort as a "bonus".

In the case of Nordre Gran, upgrading with high ambitions would not be profitable without favorable Husbank loan and without grants from Enova. On the other hand, the project shows that a concept that can

achieve low energy class 1 according to NS 3700, could trigger grants at such a high level that balanced ventilation – thereby greatly improving indoor air quality – would be possible without high additional costs.

It proved to be very difficult to present the sum of increased / saved common costs and saved private energy costs as a whole. Board members of housing cooperatives and consultants in co-operative housing associations are not used to such a presentation method, which is absolutely necessary to convince residents. The board of Nordre Gran housing cooperative is in principle in favor of the concept of upgrading with high ambitions and considered suggesting a corresponding proposal as an additional resolution at the general meeting in fall 2012. At an informal meeting in early September, however, the board decided not to go ahead with it.

SINTEF

Technology for a better society

www.sintef.no