

ANALYSIS OF PROMISING SUSTAINABLE RENOVATION CONCEPTS

Abstract

The report focuses on analyses of the most promising existing sustainable renovation concepts, i.e. full-service concepts and technical concepts, for single-family houses. As a basis for the analyses a detailed building stock analysis was carried out. Furthermore, a general method as proposal for package solutions for sustainable renovation is described. The method contains investigation of the house, proposal for sustainable renovation and detailed planning as well as commissioning after renovation.

The building stock analysis shows that detached single-family houses account for large share of the total number of dwellings in all Nordic countries. Electric heating (and oil heating) of single-family houses is very common in the Nordic countries, except for Denmark where oil/gas boiler and district heating is mostly used. Natural ventilation is widespread in Denmark while mechanical ventilation is also often used in Norway, Sweden and Finland. Houses in Norway, Sweden and Finland are typically built with wood as a main construction material, but the insulation and/or finishing materials differ. In Denmark bricks are used as a dominant construction material for cavity walls.

The typical single-family houses identified to have large primary energy saving potential almost descend from the same time period in each Nordic country. The first segment is houses built in large numbers in the 1960 and 1970. The second segment is houses built before 1940 pre-war (except for Finland) where a large part of them has been renovated, but energy renovation of those houses today would still account for a large energy saving. The third segment is houses from the post-war period in Finland, houses that are all individual but built in the same way, using the same materials.

Existing full-service renovation concepts in the Nordic countries have just recently entered the market and are not well established and their success is yet to be evaluated. Companies may improve concepts by a more integrated approach and application of the full range of technical solutions to ensure the homeowner a sustainable renovation to a reasonable price.

Energy efficiency calculations for individual measures for each of the typical single-family houses in the Nordic countries were made, and also some examples of cost analysis based on the criterion of cost of conserved energy (CCE) that takes into account the investment and running cost and savings during a defined relevant reference period.

Different technical renovation scenarios consisting of energy efficiency measures have been tested for the typical single-family houses with large energy saving potential in each of the Nordic countries. Energy efficiency measures in connection with renovation of single-family houses have the potential for very large energy savings. In general the analyses show that typical single-family houses can be renovated to the level of energy performance required for new houses today or in some cases to low-energy level. Reaching passive house level may be challenging in old houses. Passive house level was not reached in any of the analysed cases.

Positive impact on the indoor environment can be expected. Thermal comfort will be improved by insulation and air-tightness measures that will increase surface temperatures and reduce draught from e.g. badly insulated windows. A ventilation system with heat recovery will also contribute to a good thermal comfort by draught-free supply of fresh air and assure an excellent air quality. Overheating can effectively be avoided by external movable solar shadings and/or higher venting rate by use of e.g. automatically controlled windows.