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Abstract - Presentation during Annex 40 workshop at Clima2016

Presenter: MSc. Ola Gustafsson

The definition of nearly zero-energy buildings in the Swedish building code and its implications on heat pumps

In Sweden, the National Board of Housing defines the Swedish building regulations based on the European directive. The present building regulations are soon to be replaced by new nZEB regulations. For single family houses built during the last two decades in Sweden, the most common heating and ventilation system solution consists of an exhaust-air heat pump. The second most common solution is a combination of a ground source heat pump and an exhaust air ventilation system without heat recovery. Depending on the content of the new regulations it is not certain that the exhaust-air heat pump solution will be possible to use in the future, at least not to the extent it has been used until now.

The main contribution to Annex 40 from Sweden has been to investigate heating and ventilation system solutions that could meet future more stringent energy requirements in the building regulations and their outcome from an economic (LCC) stand point. Two different reference buildings have been used for the investigation, one single family nZEB house and one nZEB multifamily house. Both of these reference buildings have been modelled with floor heating and a heat pump that covers the total heating demand. A supply and exhaust ventilation system with heat recovery has been assumed as a prerequisite in an nZEB-building. The calculated specific energy use (externally delivered energy for heating, domestic hot water and operational electricity divided by the heated floor area) of the buildings was less than 30 kWh/m²yr.

The LCC-analysis show that the most cost efficient heating solution consists of a ground source heat pump together with solar PV-panels for the single family building. For the multifamily house a heating system that is made of a ground source heat pump, PV-panels and a solar thermal system is the best option from an economic stand point.

Based on the conclusions from the Annex 40 work SP Technical Research Institute of Sweden is currently running a project that further investigates heat pumps for nZEB. System optimization issues and practical implications are investigated by field measurements in two single family nZEB. Analysis of real operation conditions for heat pumps in NZEBs and how well these are reflected by the energy labelling are also addressed.