Annex 50

Heat Pumps in Multi-Family Buildings for Space Heating and Domestic Hot Water (DHW)

Executive Summary

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1. Executive Summary

The present report documents the results of Annex 50 “Heat Pumps in Multi-Family Buildings for Space Heating and DHW”. The work started officially in 2017 and was planned for 4 years. The active Annex group consisted of seven countries (Austria, Denmark, France, Germany, Italy, Netherlands, and Switzerland).

The focus of the Annex 50 was on solutions for multi-family residential buildings, with the attempt to identify barriers for heat pumps in this field and how to overcome them. Upon the demand of the participating countries, new buildings and retrofit have been considered, together with buildings with a higher specific heating demand.

Summary in one phrase: good examples exist, more standardization needed
The use of heat pump systems in apartment buildings is possible and already practiced, as shown by many examples from several countries. Nevertheless, there is still no evidence of a wider use of this solution for heat supply; the reasons being both of administrative and technical nature. This applies both to new, as well as to existing buildings.

Key Findings:

It is possible
The use of heat pump systems in apartment buildings is possible and already practiced, as shown by many examples from several countries. The variety of multi-family buildings and their characteristics make it possible to apply various technical solutions based on heat pumps.

More standardization needed
At the same time, this diversity leads to individual solutions which are difficult to apply on a large scale.

The challenge to apply heat pumps
There is still no evidence of a wider use of heat pumps in multi-family buildings for heat supply. The challenge to apply heat pump technologies and renewable energy in multi-family buildings is rather complex. Both administrative (e.g., property rights) and technical challenges stand in the way to a broad implementation of the technology.

The technical barriers to overcome

- *Heating capacity and supplied temperature*
  The multi-family buildings stock is quite old in all participating countries, with most buildings built before 1970. Without any refurbishment, these MFB need high heating temperatures (> 60°C). Moreover, in most countries, state-of-the-art heat pumps provide heating capacities below 100 kW. These types of products are only adapted for efficient buildings, not for collective heating production in old ones.
- *Access to the heat sources*
  Most of multi-family buildings are in cities, with high building density. Therefore, the access to a geothermal heat source is complicated. For air-source heat pumps the place of the outside unit (evaporator) is most challenging in respect of both – maximal capacity and the sound emission.

Key results from the Annex:

“Solution matrix”
The working group has succeeded in elaborating a general classification of heat pumps solutions for multi-family residential buildings. They have been described in a standardized way according to eight representative categories. Overall, 13 solutions have been identified, ranging from a fully centralized system to a completely decentralized system (each-room solution). The solutions have been

grouped into five “families”, each grouping specific sub-solutions.

Case studies database
Parallel to the theoretical classification of the solutions, numerous case studies representing implementation of heat pumps in multi-family buildings have been collected. The cases show a wide variety of possibilities for use of heat pumps, depending on the energetical standard of the building, its number of apartments, heat source and further characteristics. To reflect the holistic approach and to illustrate the practice, each case study is connected to a corresponding theoretical solution.

It is intended to continue the presented work, inter alia through extending the case studies database within the frame of the new Annex “Heat pumps for multi-family residential buildings in cities”.

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