Wall and Heating Systems

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Executive Summary

The goal

Main goal of this study is to set up a guideline of available state-of-the-art system solutions of building materials and insulation systems, which would represent a helping decision-making tool. It is intended for architects, building engineers, other professionally-oriented people, who aim to update themselves with relevant information. This report should help the reader during the planning process of a building, to find the optimal integrated heating system for a building and therefore also give an insight over the variation in the energy efficiency for those systems, by calculation. Additionally, it provides a summary of criteria to be considered for the integration of heating systems into the building.

The approach / Methodology

Research of available literature from main manufacturers and technical literature is carried out. The focus is set on analysis of typical wall systems, building and insulation materials; a range of different heating systems for three installation surfaces (wall, floor and ceiling). An overview of the most common heat sources as well as a summary of main principles of the building physics is done. Thermal comfort criteria are discussed and energy calculation with calculation examples and supportive guidelines is carried out. In addition to theoretical analysis, calculation of energy demand and LCC for the chosen cases is implemented, in order to show the variables that affect the decision-taking process.

Results

As a result, an elaboration is provided, which enables the reader to get a quick overview about the above mentioned topics. Different supporting tools like step-by-step calculation examples or the heating system-matrix are set up. It helps to simplify the decision making process and enables a quick comprehension of the single workingsteps, as well as a help to transfer them into one's own work. Additionally, main outcome of calculation example showed that energy source “Cogeneration unit + Solar energy” demonstrated the highest potential of energy efficiency.

Conclusion

To summarize all said above, this report allows the reader to get an insight into the factors, which affect the decision process not only of a proper heating system solution, but at the beginning stage of the design of a building and taking all influences on the desired comfort into account.

Recommendations

Wall and Heating system have a wide range with continuously changing state of the art. Therefore it's necessary to keep the study up to date and also include new and additional systems for getting a better overview over the market.

As a suggestion for a further research, next generation of research groups of Wienerberger Sustainable Building Academy could find it useful to get acquainted with a current study and include further topics, e.g. differences in the physics of the building through different installation surfaces. Along with that, a more detailed calculation of calculation cases with the highest potential could be implemented.