OPTIMIZING THE ENERGY EFFICIENCY OF BUILDINGS IN THE DESIGN PROCESS BASED ON BIM TECHNOLOGY

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SUMMARY

The topic of the dissertation is to study the issue of optimizing the energy efficiency of buildings in the design process. Despite the high level of knowledge regarding energy-efficient construction, publications relating to the design process itself, tasks, competencies and opportunities for optimizing the energy efficiency of buildings, are insufficient, and the transfer of theoretical knowledge to architectural practice is limited. The dissertation is written in the mode of an implementation doctorate and is a record of research and analysis related to the design of multifamily residential buildings. The dissertation systematizes the knowledge of energy efficiency optimization and its methods in architectural practice. The validity of using BIM software to reduce the energy intensity of buildings was investigated and, based on this technology, a methodology for optimizing energy efficiency at the initial stages of the design-build process was proposed. A case study of buildings subjected to energy optimization was also conducted to determine the ranges of parameters within the building's characteristics, based on literature research. On this basis, optimization scenarios were created, which were then applied to a baseline model developed from a digital twin of an existing building. The research performed confirmed the validity of the theses. The issue was discussed in the context of integrated design. Recommendations were set for the design process and the architect's working methods.