

## **An Innovative Approach to Sustainable Development on The Example of Assessing the Energy Standard of Office Buildings Using Simulation Modelling\***

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### **Abstract**

Sustainable development is aimed at improving the quality and comfort of life. For this reason, the concept of sustainable construction is often mentioned. In the literature on the subject, this concept is defined as a series of activities aimed at reducing the negative impact of buildings on the environment throughout their life cycle, from project preparation through the construction process to operation. The aim of the article is to assess the energy standard of office buildings using simulation modeling. As part of the research, the possibility of designing and implementing sustainable buildings was assessed. The research was based on simulation modeling based on Polish energy standards applicable from January 1, 2014, 2017 and 2021. As part of the developed case studies, comparative assessments were carried out in the field of improving the energy performance of buildings with different quality partitions. The study included an analysis of the building's life cycle, which meets all the requirements resulting from the principles of building design for safe use and the principles of sustainable construction. The methodology used in the work uses various research tools, including a multi-criteria analysis, which allows for taking into account the changing socio-economic conditions in the assessment of the development of intelligent buildings. The obtained results indicate large benefits and make it possible to determine the possibilities of implementing national tasks in the field of reducing final energy consumption and increasing the share of RES in covering its demand. Additional benefits include environmental savings and increased safety and comfort in their use.

**Keywords:** Sustainable Development, Innovation, Simulation Modeling, Thermal Modernization, Energy Consumption.