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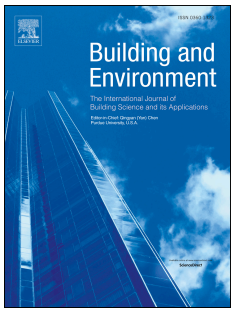

On the performance of LCC optimization software OPERA-MILP by comparison with building energy simulation software IDA ICE

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On the performance of LCC optimization software OPERA-MILP by comparison with building energy simulation software IDA ICE

Case study: energy renovation of historic buildings

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Abstract: From an economic point of view, it is crucial to minimize the life cycle costs (LCC) of buildings undergoing energy renovations, hence an optimization approach is needed. Building energy use and power demand as well as energy efficiency measures are important issues while performing an LCC optimization. Thus it is of great importance to accurately predict the building energy use and power demand before and after energy renovation.

This paper aims to address the performance of an in-house LCC optimization software, OPERA-MILP, which has a rather fast optimization procedure. The aim is fulfilled through comparison with building energy simulation software IDA ICE before and after cost-optimal energy renovation. Three historic buildings with different layout and construction properties are used as a case study.

The results show good agreement in the calculations of buildings' power demand and energy use between OPERA-MILP and IDA ICE. The percentage difference in calculated annual energy use and buildings' power demand with OPERA-MILP compared to IDA ICE is shown to be maximum 11% and 8% for the studied climate zones, respectively. Total impact on LCC is estimated to be equal to or less than 8%.

Key words: OPERA-MILP; LCC optimization; IDA ICE; Building energy simulation; Historic buildings; Energy renovation