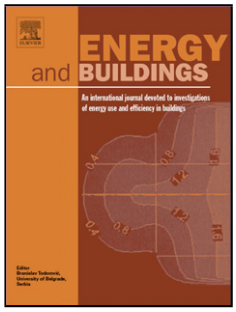

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Improving the energy sustainability of a Swiss village through building renovation and renewable energy integration

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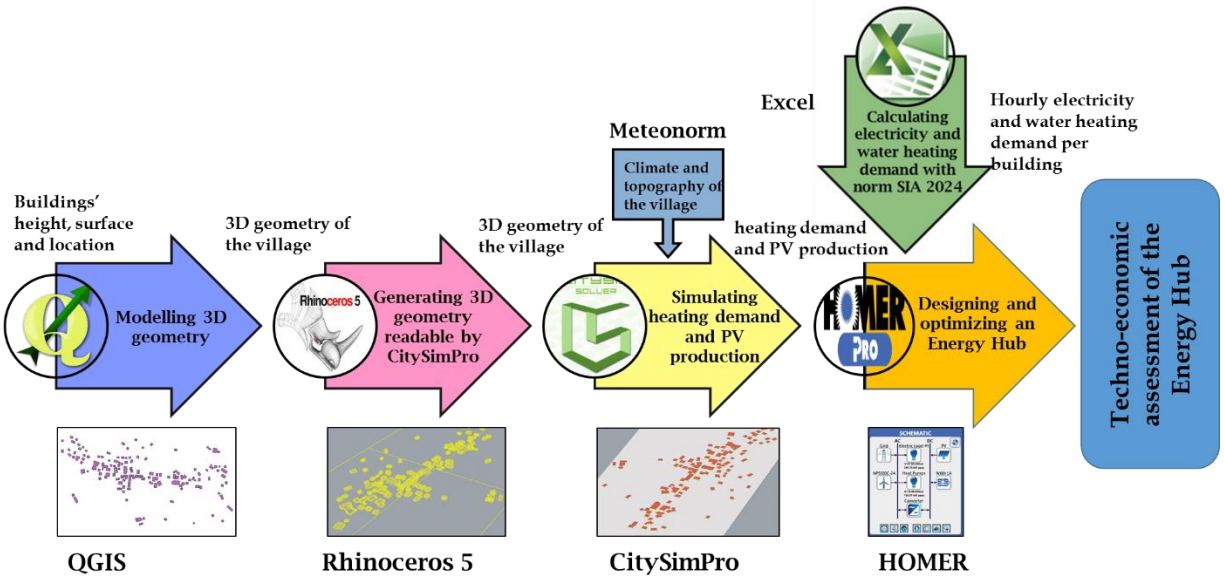
Graphical Abstract



Abstract

The integration of renewable energy technologies and building renovation are the two main procedures for improving energy sustainability of buildings at neighborhood scale. It is a difficult, however, to optimize these procedures simultaneously. This study focuses on improving energy sustainability of Hemberg, a Swiss village with a population of about 900, through optimizing these two procedures. For this purpose a computational platform was developed, combining software CitySim, HOMER Pro, QGIS and Rhinoceros. The energy demand on hourly basis for the buildings in the village was analyzed through comparing the current demand with that after retrofitting according to the Swiss energy labels (i) Minergie and (ii) Minergie-P. Swiss energy maps were used to identify the most promising renewable energy sources while three scenarios were considered for solar PV integration and energy system improvements. The first scenario presents the current condition in the village, while the second scenario explores improvements in electricity generation and the third in both