Algorithmic design tool for integrating renewable energy infrastructures in buildings

Object Oriented Design for energy efficiency

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Abstract. We present a tool which empowers 'green' design freedom for architects by presenting ever expanding choices in components and materials and automatizing their configuration and placement. Several time- and resource- consuming initial design iterations are eliminated by optimizing the energetic efficiency of the building in the original draft phase. The smart, efficient, energy producing building of the future can thereby offer increased cost and energy efficiency, security and comfort, without any compromise in style and form - on the contrary, the proposed tool stands to open up a novel palette of creative 'green' architectural design elements, which would effectively be co-designed by architects. The proposed algorithmic CAD design tool allows direct integration of renewable sources in the architectural design phase, taking into account local meteorological and solar radiation conditions. Furthermore locally optimized evolution and modification of renewable components integrated into the building's structure is possible, leveraging an increasingly wide range of possibilities in form, finish and renewable energy generation.

Keywords: Algorithmic and parametric design, data analytics, performance-based design, smart buildings and smarts cities.