

## Abstract

Multiple and sometimes conflicting design aspects such as energy efficiency, architectural quality and environmental comfort for occupant satisfaction need to be addressed simultaneously when designing low-energy buildings holistically. However, the technical and thereby measurable qualities has a tendency to overrule the softer values, why recent research aims to transform spatial qualities into quantitative metrics, in order to support a more equal dialogue among multiple stakeholders.

This paper presents a computational building model in which the ability to simulate the performance of two architectural metrics for evaluating spatial quality were implemented concerning (1) *View-Out Quality* and (2) *Degree of Privacy*, alongside with a tool for daylight and thermal performance simulations.

The model was used in a case study in Aarhus, Denmark, where design of a facade for a living room in a senior dwelling was conducted, in order to illustrate how the new set of measurable architectural metrics may instigate a more qualified and holistic discussion on feasible trade-offs between energy use, daylight level, thermal indoor climate, and spatial quality (i.e. the notion of degree of view and privacy) in the design process.

## Impact

- Task 1.4 “Assessment of added value due to architectural aspects”.
- Task 1.5 “Development of holistic framework for assessment of added value in building renovation”.
- Task 3.2: “The added value of architectural transformation generated by energy-efficient renovation solutions”

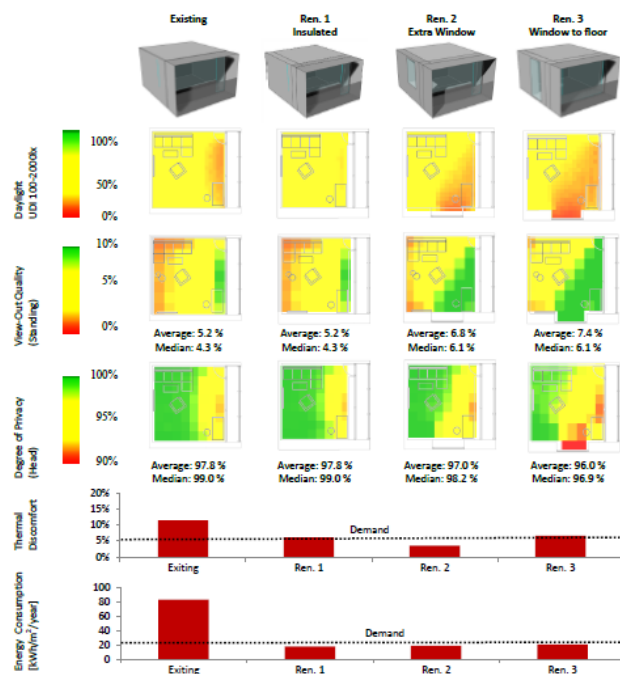


Figure 4. Simulation output evaluated with multiple metrics.

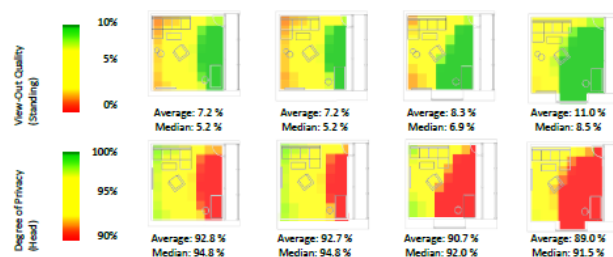


Fig. 1: Simulation output of evaluation metrics. For further details please refer to the full paper.

Purup, P. B., Jensen, S. R., Kirkegaard, P. H., Petersen, S. (2017). "Towards a Holistic approach to Low Energy-Building Design: Consequences of Metrics for Evaluation of Spatial Quality on Design". Publiceret I proceedings fra PLEA 2017, Edinburgh, Skotland.