

**Aant van der Zee**

*Paper:* **Energy consumption as design principle**



**Abstract:**

In this paper we will outline the development of a design tool, for the early design phase, based on an integral design strategy, with respect to energy-performance and spatial layout. The proposed tool will help the designer to generate a draft that fulfills both criteria and analyze their mutual effect..

Energy consumption reduction is implemented by the government in the Netherlands and many other countries by gradually reducing the energy performance coefficient over the past years. Designers and engineers have adjusted their design and materials such that could meet the new standard. However, up to now this has not lead to dramatic changes in the architectural layout of buildings. We anticipate that at some point substantial changes in design and material use are needed. Our aim is to find this point through the generation of design alternatives for housing as a function of decreasing energy consumption.

In order to generate alternatives, which can be tested against the energy performance constraint and spatial conformances, the design is parameterized. We depict housing, as parameterized apartments, corridors and envelopes. Each of the parameters represents physical, geometrical and topological properties. By systematically changing these variables, the GA is able to generate alternative spatial configurations and envelope sections.

We start with a normal heat resistance for the envelope and let the GA generate layouts that meet the energy performance coefficient given the spatial conditions. Subsequently, the energy performance coefficient will be reduced to study the changes in spatial layout.

**Topic: Architecture**

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