

## Visual comfort of luminescent solar concentrators in offices

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## Poster

# Visual comfort of Luminescent Solar Concentrators in Offices

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### Introduction

The need for energy conservation in buildings has spurred innovations in (window) technologies. One of these innovative technologies is the Luminescent Solar Concentrator (LSC). The LSC is a device, employing a polymeric or glass waveguide and luminescent molecules to generate electricity from sunlight when attached to a photovoltaic cell. Such a device has the potential to find extended use in an area traditionally difficult for effective use of regular photovoltaic panels: the built environment.

However, a major issue in the use of LSC as a window technology is the color of the dye on the glass essential for the energy performance of the device. The colored glass alters the daylight penetrating into the room in terms of wavelength, distribution and luminous flux. All this affects the perception and quality of a space and therefore the acceptance of the user.

The objective of this research is to find the optimum percentage of LSC in terms of energy efficiency related to the preference and acceptance of the user. A sub question is whether the tolerance of people towards colored glazing changes when they are aware of the fact that the colored glass is part of a sustainable device.

### Methods

Furnished scale models (1:6) of a day lit office room are made and evaluated (Figure 1), using different percentages of colored glass in the transparent façade (Dubois et al., 2007). For this evaluation, 40 test subjects in the age between 21 and 28 are asked to complete questionnaires. The subjective ratings obtained from the questionnaire

responses are analyzed statistically with SPSS statistics.

Different light measurements are done to assess the illuminance, luminance and spectral irradiance inside and outside the scale model and to link the subjective ratings to objective light values.



Fig. 1: Scale model, shown with 50% colored glass

### Results

The pilot studies demonstrate that in general the visual impression is scored increasingly positive in linear proportion as the percentage of colored glass decreases. Surprisingly, people valued the transparent façade with 25% of colored glazing as more comfortable than a fully transparent façade (0% of colored glazing). When people are informed about the energetic aspect, 1/3 accepts a higher percentage of colored glass in the transparent façade than without knowing.

The full experiment is planned in September and October 2014. Results will be presented in December at the Eindhoven University of Technology.

### Reference

Dubois, M.C., Cantin, F., Johnsen, K. (2007) *The effect of coated glazing on visual perception: a pilot study using scalemodels*. *Lighting Research and Technology*; 39(3) 283-304