Conventional lighting versus LED-lighting. Residents' perception of quality of light, accessibility and danger

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Introduction

We are facing a shift towards more energy efficient solutions for outdoor lighting. Light Emitting Diodes (LED) are considered to have large energy saving potential, constituting an ecologically sustainable alternative to conventional lighting. Knowledge of how this light source is perceived and the possible effects on perceived accessibility and safety is limited, but will be crucial for the impact of LED from a social sustainability perspective.

The Human Environment Interaction-model (Küller, 1991) proposes that people are in constant interaction with the physical environment. Properties of the environment, such as artificial out-door lighting, may inhibit or promote certain behavior. Individual characteristics such as perception, personality and attitudes, mediates this interaction and must also be considered.

Well-designed artificial lighting can increase the perceived safety and accessibility of out-door environments after dark (Painter, 1996), and subjective quality of light might be a better predictor than objective measures of illuminance regarding individuals´ psychological responses to the environment (Küller, Ballal, Laike, Mikellides & Tonello, 2006). The perceived brightness of the lighting along a footpath has been found important for accessibility, whereas hedonic tone along with brightness predicted perceived danger (Johansson, Rosén and Küller, 2011).

Objective and method

This intervention study compares conventional outdoor lighting (High Pressure Sodium in Area 1 and Mercury in Area 2) and LED regarding residents' perception of i) the quality of the light, ii) accessibility and iii) danger. All conventional light sources in out-door public spaces of two multifamily residential areas were replaced by retrofit of LED-light.

Residents above 18 years of age (n = 89 in February 2010 and n = 69 in February 2011) rated the quality of light, as well as perceived danger and accessibility, while being outside on a weekday after dark. In addition photometric measures were conducted and energy use was calculated.

Analyses and discussion

Multivariate analysis of variance will be used to identify differences between perceptions before and after the installment of LED lighting. The results will be presented in relation to the photometric measures obtained and will provide suggestions on how future out-door lighting projects need to be designed to provide safe and secure, and at the same time energy efficient, out-door environments.

References

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