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Opinion: Floodlighting guidelines to be updated

The Society of Light and Lighting

The rising popularity of architectural floodlighting can be readily observed. Adding to the obvious historical considerations or the needs of landscape architecture, the variety of products offered by lighting equipment manufacturers has significantly increased in recent years.

Typical floodlighting installations consume from several hundred watts to several kilowatts of power. This relatively low level of installed power results from the increased use of luminaires with energy-saving light sources (including LEDs). However, in most countries, the issue of energy efficiency and floodlighting has not been addressed by introducing appropriate legal regulations.

Standards and technical reports related to outdoor lighting rarely deal with the issue of floodlighting. CIE 094:1993 *A Guide for Floodlighting* and CIE 234:2019 *A Guide to Urban Lighting Masterplanning* contain the only international guidance issued so far, and contemporary problems of floodlighting are described in a very general way. Together with CIE 126:1997 on minimising sky glow and CIE 150:2017 on limiting obtrusive light, the reports cannot be recognised as standards, and leave many questions unanswered:

- How is the average luminance of a given floodlighting scheme to be predicted?
- What other calculations should be made at the design stage?
- Should the light produced by an installation be measured?
- How is an installation's compliance to be determined?

In the case of road lighting, calculations, verification and energy efficiency provisions have recently been set out. These do not guarantee the engineering correctness of the proposed solutions or their reliability, but they do guard against the worst errors. So why has nobody so far managed to develop similar tools or requirements for floodlighting?

We have studied the current state of floodlighting installations, and conclude that:

- designs have often been created without insufficient attention (e.g. due to errors in lighting simulations);
- luminaries may be assembled from unreliable equipment, leading to visually unattractive and unsatisfactory installations; and
- there is a high prevalence of solutions which are energy inefficient; therefore
- there is a high risk of solutions which increase the light pollution phenomenon.

Whilst growing, floodlighting contributions towards general environmental light pollution are still admittedly rather minimal, compared to, say, road lighting. However, the impact on the local area is large, due to the beam spread of the luminaires. In the case of floodlighting, energy losses are directly related to environmental light pollution. In an ideal case, the total luminous flux of the luminaires reaches only the surfaces to be illuminated (with the proper average luminance), and light pollution is only caused by reflections.

Widespread light pollution can affect the functioning of the entire ecosystem. White- and blue-rich LED technologies are intensifying this phenomenon. This is important because there is an upswing in light pollution from floodlighting installations due to the

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growing popularity of architectural lighting. For example, over the past three decades, the number of installations in Poland has increased throughout the whole country, from only about a dozen, to several hundred in major cities.

To summarise, it seems that guidelines for floodlighting design should be updated (as soon as it is possible) to reflect the current state of science, and in the context of changing knowledge, practices and technologies.

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