

ENVIRONMENTAL COMPATIBILITY OF LED LUMINAIRES IN ROAD LIGHTING

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At the end of the last 2007 Session in Beijing CIE issued a declaration inviting all the operators in the field of lighting to save energy.

Road lighting is reputed to contribute to energy budget with a rather high 5% amount of the world consumptions, including both the public and the private sectors. According to a recent survey carried out within the European Community, large savings can be expected through a careful design of lighting installations associated with efficient light sources and luminaires.

Further to that, attention is paid more than in the past on the reduction of the nuisances of road lighting, both for the obtrusive light and the artificial luminance of the sky.

In this framework, the LED can play a major role for a number of reasons like:

- the white light with a high colour rendering with a better perception of obstacles in peripheral vision at mesopic levels;
- the higher visual comfort of white light;
- the small size and the possibility of an accurate aiming of the light beam, with higher utilisation factors;
- the long life with reduced maintenance costs;
- the luminous efficiencies continuously increasing because of the technological innovation, with foreseen targets higher than high pressure sodium lamps;
- the promising further savings due to an easy 0-100% dimming.

Since most lit streets and roads are designed for motorised traffic according to luminance criteria, the characteristics of LEDs are suitable for generating the prescribed road luminance levels while minimising the road illuminance, on which both the energy consumptions and the upward reflections depend, with a substantial contribution to environmental compatibility.

The possibility to control the emitted light flux in a wide range is a key factor to adapt the lighting system performances to the minimum requirement for traffic.

The paper describes the characteristics of external LED lighting with special considerations to the improvements on the environment which can be expected from the use of this light source. The performance of some LED luminaires are compared with discharge lamps luminaires and with the road lighting standards in order to evaluate their efficiency. Moreover, the environmental compatibility is verified according to the revision of CIE 126, with the European CELMA method and with the CIE publication 144.