

 **INDUSTRY NEWS**

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**Light and human health: LED risks highlighted**

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***Issues relating to the effects on health and well-being of artificial light are discussed in three recent publications; including one that says the blue-light component in white LEDs causes toxic stress to the retina.***

It is now accepted that artificial night-time lighting has various effects on humans (not to mention wildlife) and that exposure to optical radiation affects human physiology and behavior, both directly and indirectly. Many areas are not well understood, and a position statement from the Illumination Engineering Society (IES) emphasizes mainly the need for further research. At the other end of the scale, a French government report emphasizes the risks of LED lighting and makes various recommendations.

**IES position statement and DOE white paper**

The Illumination Engineering Society (IES) has released a [position statement](#) entitled "Effects of Exterior Lighting on Human Health (PS-03-10)," which is not specific to LEDs. The document states that "optical radiation detected by the retina impacts an individual's behavior, psychology, and perception of the environment. The position of the IES is to promote and encourage a more complete understanding of human responses to optical radiation leading to improved designs for all lighted environments."

The way to achieve this, says IES, is through additional research with specific emphasis on additional field research to document typical exposures to optical radiation in exterior settings. The document also states that "the position of the IES is that typical exposures to exterior lighting after sunset have not been shown to lead to cancer or other life-threatening conditions."

Meanwhile, the DOE Solid-State Lighting program has produced a [White Paper](#) entitled "Light at Night: The Latest Science," which resulted from a panel session at the [SSL Market Introduction workshop](#) held in July 2010.

The white paper concludes that, given the available research, it is unclear what changes, if any, should be made to current best-practice lighting design. "It is clear that additional peer-reviewed research and validation are required to determine the relative significance of the visual and the photo-neural effects of typical light exposures," says the report.

**ANSES highlights risks from LED lighting**

ANSES, the French Agency for Food, Environmental and Occupational Health & Safety, has published a report entitled (in English): "Lighting systems using light-emitting diodes: health issues to be considered," which focuses squarely on potential problems caused by LED lighting.

The [full report](#) is available in French only, but the report summary (in English) says that risks have been identified concerning the use of certain LED lamps, raising potential health concerns for the general population and professionals. "The issues of most concern identified by the Agency concern the eye due to the toxic effect of blue light and the risk of glare," says the report, adding that the blue light necessary to obtain white LEDs causes "toxic stress" to the retina.

Blue light causes a photochemical risk to the eye, says the report, the level of which depends on the accumulated dose of blue light to which the person has been exposed, which is generally the result of low-intensity exposure repeated over long periods. "Blue light is recognized as being harmful and dangerous for the retina, as a result of cellular oxidative stress," says the report, adding that 3 groups are particularly at risk; children, populations which are already light-sensitive, and workers likely to be exposed to high-intensity lighting.

The other main risk is from glare. The report says that, for indoor lighting, it is generally agreed that luminance higher than 10,000 cd/m<sup>2</sup> causes visual discomfort whatever the position of the lighting unit in the field of vision. Because the emission surfaces of LEDs are highly-concentrated point sources, the luminance of each individual source can be 1000 times higher than the discomfort level. The level of direct radiation from this type of source can therefore easily exceed the level of visual discomfort. Other risks related to the use of LED lighting systems have also been raised, but further study is required.

The report says that the photobiological safety standard (EN 62471) seems ill-adapted to lighting systems using LEDs, and that the Unified Glaring Rate used for the other types of lighting is unsuitable for LEDs. Among various recommendations, ANSES says that only LEDs falling into risk groups similar to those of traditional lighting systems be available to the general public, and that the highest risk lighting systems be reserved for professional use under conditions in which it is possible to guarantee the safety of workers.

Manufacturers and integrators of lighting systems using LEDs are encouraged to use optics or diffusers, for example, so that the beams of light emitted by the LEDs cannot be seen directly, to avoid glare. Manufacturers should also take account of the progressive wear of layers of phosphor in white LEDs, which in time could lead to devices being moved from one photobiological risk group to a higher one, according to ANSES.

#### **About the Author**

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#### **COMMENTS**

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