

**Sustainable lighting solutions for Ex and non-Ex areas**

**Industrial lighting within the context of environmental protection**

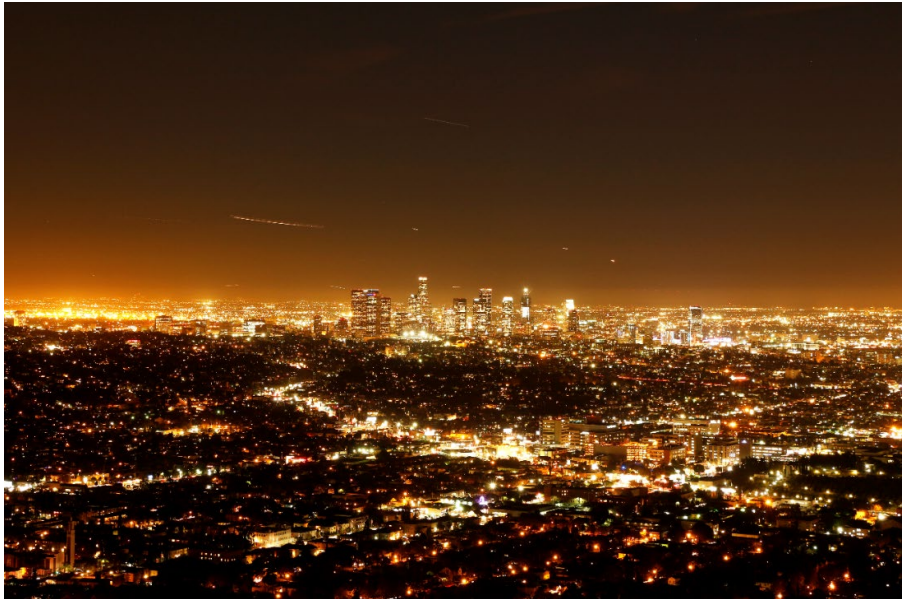
*Waldenburg – When planning and installing lighting systems for industrial plants, ever more emphasis is being placed on considering the ecological aspects. Sustainable, energy efficient and environmentally friendly lighting solutions for indoors and outdoors are in more demand than ever before as we aim to conserve our natural resources. This includes measures to reduce light emissions and modifications to lighting technology to protect particularly sensitive ecosystems.*



LED technology is a superior alternative to conventional lighting solutions in almost any area, for almost any application. Converting around 35% of their energy consumption into light, they are around twice as efficient as gas discharge lamps and fluorescent tubes. Thanks to their reduced energy consumption, the light-emitting diodes contribute to lowering CO<sub>2</sub> emissions and protecting the environment. LED light fittings also outdo conventional lighting technology when it comes to their service life, which is multiple times longer. With a service life lasting up to 100,000 operating hours, they have proven to be particularly sustainable and require far less maintenance or replacement. Unlike lamps that contain mercury, LED lights are also free from toxic substances, in particular mercury, and can therefore be disposed of much more easily and in an environmentally friendly manner.



THE STRONGEST LINK.



**Image 1:** The emission of bright light can affect the natural behaviour of animals and plants

### **Sustainably outstanding luminous efficacy**

At its Weimar-based competence centre for lighting technology, R. STAHL is driving the development of modern, environmentally friendly industrial lighting solutions for Ex and non-Ex areas. As a forerunner in the industry-suitable LED light fitting sector, the company offers a wide range of extremely energy-efficient, long-lasting light fittings in a variety of designs made for almost any application, both indoors and outdoors. Their portfolio ranges from general lighting to emergency lighting, signal lights and safety lighting – and even includes custom-made products using a converted LED colour spectrum for special applications. The newest generation of R. STAHL's EXLUX light fittings is the latest addition to their product range. The new extremely efficient EXLUX light fittings in the 6002/4 series generate a luminous efficacy of either 115°lm/W or 145°lm/W without a diffuser – surpassing the performance of the economical previous version by some margin. Energy costs with these luminaires are around 40% less than with conventional fluorescent lamps. They offer excellent service life coupled with outstanding fail-safe reliability and minimal maintenance; even when they exceed 100,000 operating hours, 90% of the original luminous flux is still guaranteed. The new EXLUX generation is certified according to ATEX and IECEx for worldwide operation in Zone 1/21 and 2/22 and can be installed as a ceiling, pendant or pole mounted light fitting to provide general lighting.



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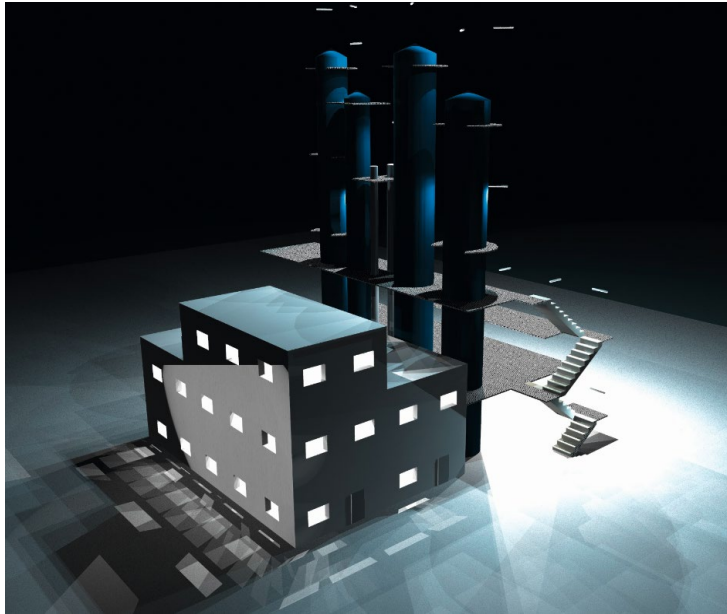
**Image 2:** The long-lasting EXLUX 6002/4 series enables energy cost savings of up to 40% and digital light management thanks to the integrated DALI interface

### **Systematically combatting light pollution**

As well as efficient, energy-saving lighting and light fitting technology, a sustainable lighting concept also requires professional lighting design that guarantees standard-compliant lighting at business premises that is as environmentally friendly as possible. As a result, R. STAHL considers both the relevant standards for workplace lighting and measures to prevent artificial light from having a negative effect on ecological aspects of the environment. Industrial light, alongside street lighting, illuminated advertisements and floodlight systems, is one of the main sources of irritating light pollution that creates significant "light domes" and lights up the night sky over urban areas. Light pollution – the emission of artificial light into the atmosphere and subsequent reflection of this light by fine particles – does not just affect human biorhythms. It also has detrimental effects on animals and plants. For instance, artificially brightened surroundings affect plants' growth cycles. Light emissions with a high proportion of blue light, which is characteristic of cold white LED lighting, can disrupt nocturnal insects' and migratory birds' sense of direction, as well as affecting the breeding and feeding behaviour of a range of species.



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**Image 3:** A sustainable lighting concept requires efficient, energy-saving lighting technology and professional lighting design

### **Optimised lighting**

Up to now, there are still no binding regulations limiting light emissions from industrial plants; as a result, it is down to lighting manufacturers and lighting designers to make their customers aware of this important issue. Unfavourable light distribution caused by improper planning, installation errors or outdated lighting not only has a negative effect on plants and animals – it also wastes energy, thereby driving operating costs higher and higher. From a design perspective, therefore, the aim is to provide optimum lighting that illuminates all required areas evenly and with as few shadows as possible, without losing scattered light. Using software-based planning tools such as ezyLum from R. STAHL, every inch of an industrial site can be mapped precisely in 3D, including area calculations, standard objects and shadows. The number and position of light fittings and the required luminous flux of the lighting can be accurately determined for defined mounting surfaces. The radiation angle can be adjusted in all three axes, which enables the light to be directed almost entirely towards the area to be illuminated – this reduces and can even eliminate disruptive light emission.

### **Modified lighting technology**

Compared to conventional lighting, which emits light across a wide angle, light-emitting diodes can be aligned for use as a superior half-room spotlight. The special light design prevents unwanted light emission into the upper half of the room caused by reflection within the light itself. For this purpose, R. STAHL



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manufactures special versions of its tubular light fittings and linear luminaires with a minimised upward light factor. The light distribution curves are modified using a method suitable for the specific characteristics of the light-emitting diodes in use – either refractively using lenses or using reflectors – to eliminate upward light. Additionally, semiconductor technology makes it possible to modify the LEDs' emission spectrum and eliminate unwanted colour components. Depending on the semiconductor material and conversion used, the wavelength of the light emission can be deliberately limited to certain spectral ranges. Compared to conventional solutions such as filtered fluorescent lamps, this more than doubles the efficiency of the lighting. What's more, functional limitations that would otherwise be caused by filter or film material fatigue over time are a thing of the past. R. STAHL manufactures light fittings with a converted colour spectrum for a range of uses, including the pharmaceutical industry, photo development or signaling safety equipment such as emergency showers. This equipment is also used for onshore and offshore projects in areas with a sensitive ecosystem; in these environments, unmodified artificial light could have a significant negative effect on the natural behaviour of endangered species.



**Image 4:** R. STAHL supplies LED light fittings specially for outdoor use – developed with a view to ensuring that they have zero impact on our natural environment. For instance, yellow lighting is used to prevent any effects on the natural behaviour of sea turtles.



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### **Illuminating species conservation**

R. STAHL collaborates with relevant environmental organisations to develop environmentally sustainable lighting for industrial plants and delivery platforms in protected conservation zones. The geography of the area is used as a basis to determine whether endangered species are found in the area to be lit and, if so, how sensitive these species are to light emissions in a certain colour spectrum. Artificial light with a predominantly blue component is particularly attractive to many animals. It stimulates their mesopic vision, which confuses the animals into thinking that it is dawn or dusk and, as a result, triggers their hunting, flying or defence instincts. For example, the natural behaviour of endangered sea turtles is affected by this type of light. To protect these animals, R. STAHL has developed a "turtle-friendly" lighting version with a light spectrum that has been shifted towards yellow. This solution is specifically intended for use as external lighting on oil rigs and plants close to the coast. The use of particularly warm white light ensures that newly hatched animals are not drawn away from their path to the sea and does not disrupt the biological rhythms of the adult members of the species.

### **In short**

Protecting the environment from harmful light emissions is becoming more and more important in the lighting industry. Industrial sites in ecologically sensitive regions and increasing light pollution in urban centres require light manufacturers and lighting designers to rise to the challenge of developing sustainable, environmentally friendly solutions. Thanks to its lighting centre, the explosion protection specialist R. STAHL can rely on comprehensive expertise in the areas of lighting technology and planning, which enables the company to implement explosion-protected lighting solutions even when there are tricky ecological conditions to consider.