



## LED Lighting benefits

Compact LED construction, high operating efficiency, eco-friendliness and optimal lighting design **/This is Why** Sharp offers LED Lighting.



Turn the many benefits of LED lighting to your advantage! LED technology is said to be the most important invention in the history of lighting since Edison invented the incandescent lamp more than 100 years ago. High operating efficiency thanks to constant improvements in system efficiency and service life, flexible design and colour, high eco-friendliness and numerous possibilities for application all make LEDs the lighting tool of today and the future.

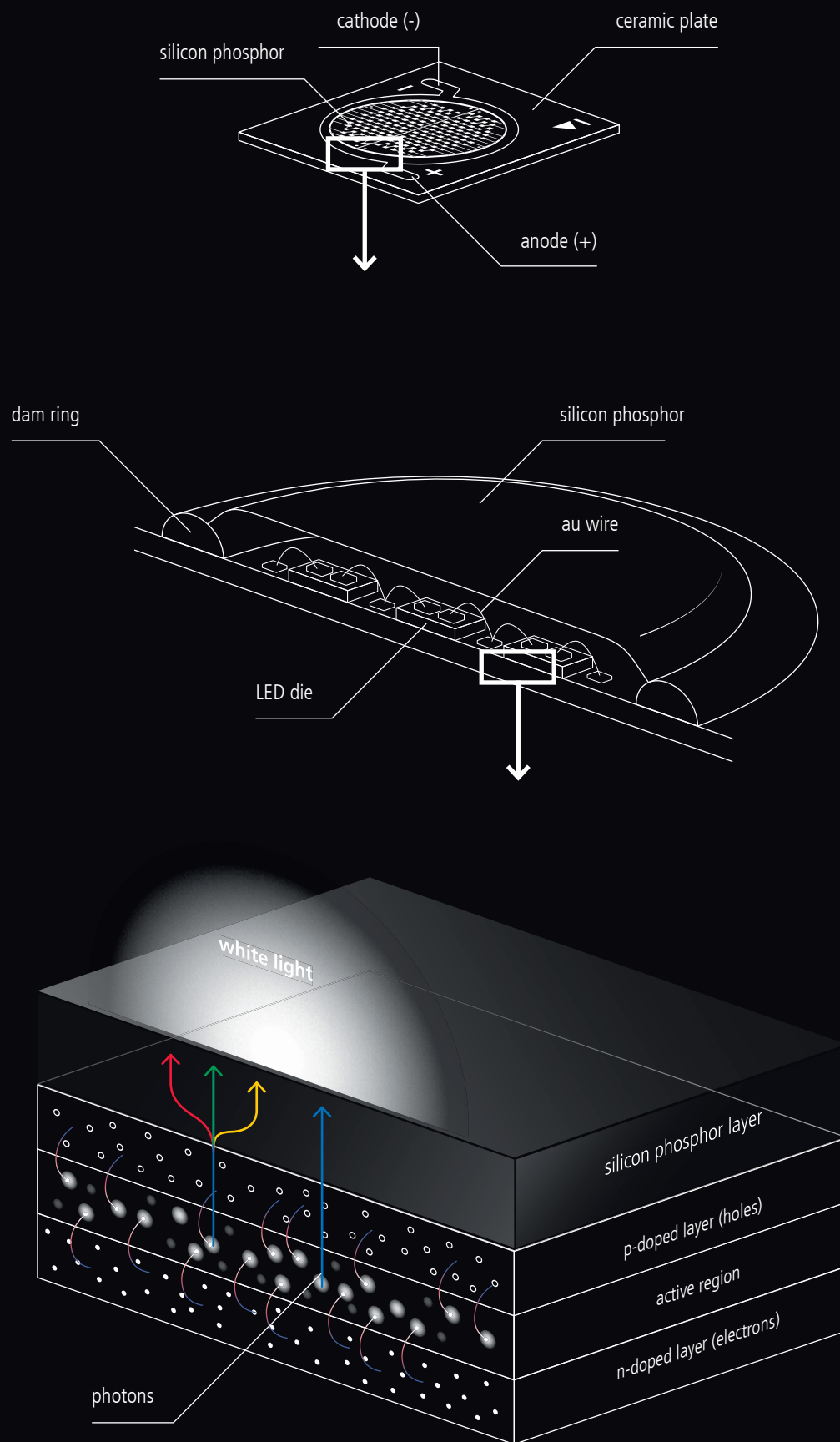
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## Sharp ZENIGATA COB



### 1. Compact LED construction

There are various LED construction types. But all types have one thing in common: The compact design. LED chips with less than 2 mm height enable completely new possibilities for the product design of luminaires and thereby as well for the lighting design.

But how is light generated in such a small unit? The structure and functioning of a high-power white LED is explained by reference to Sharp chip-on-board (COB) ZENIGATA technology in the diagram on the left.

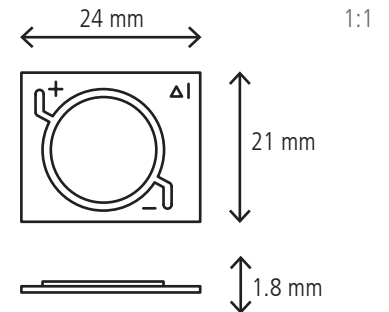
A COB LED device consists of a matrix of LED chips connected in series and parallel to one another. To ensure efficient thermal management, the LED chips are installed on a ceramic plate.

Each chip contains both a p-doped and an n-doped layer. When voltage is applied, the negatively charged electrons migrate from the n-doped layer towards the p-doped layer, while the positively charged holes migrate in the opposite direction.

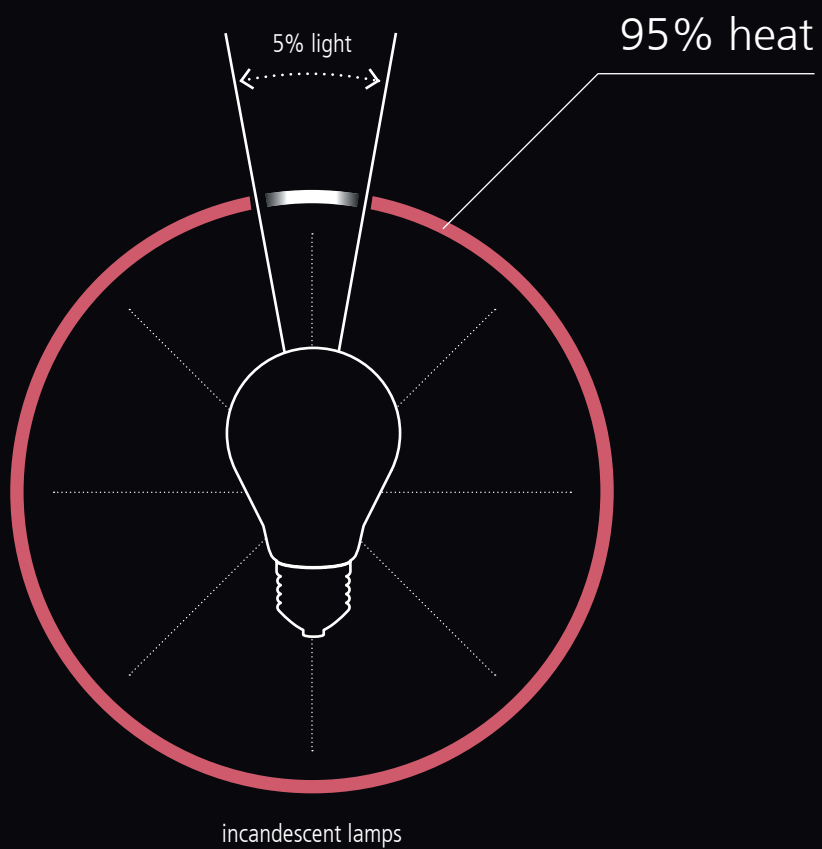
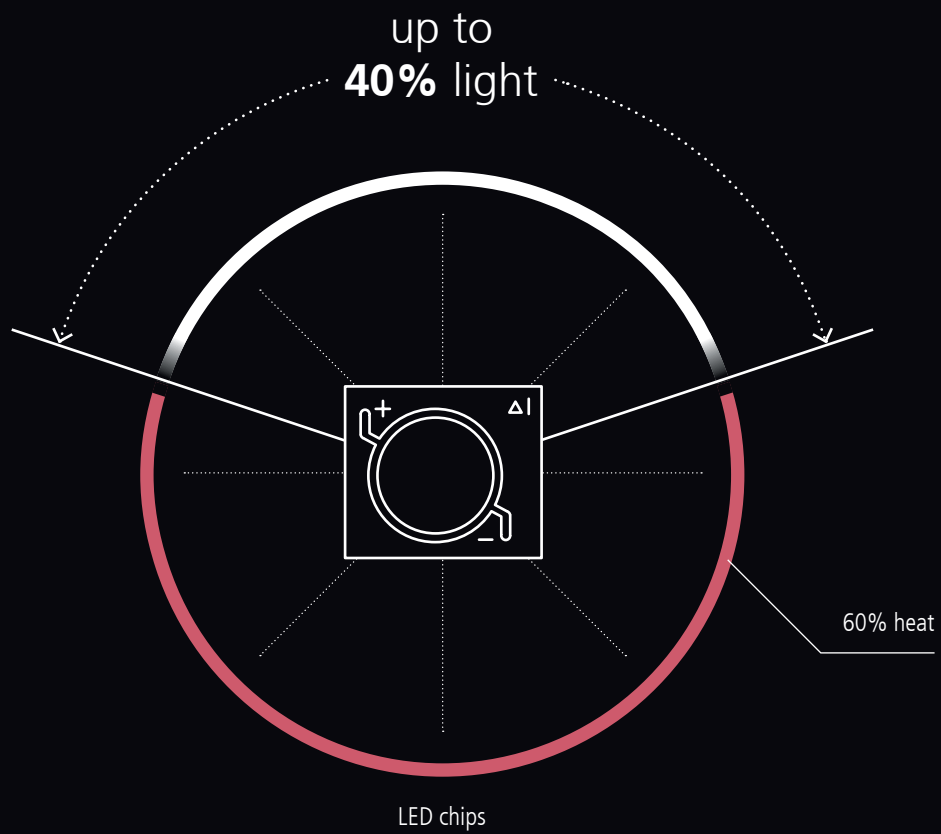
Recombination of electrons and holes in the active region results in the emission of "blue" photons. As blue photons pass through the phosphor region, some undergo colour conversion to green, yellow and red photons. White light results from the combination of photons across the entire visible spectrum.

Depending on the application, light can be directed via the luminaire's secondary optics (e.g. reflectors, diffusors or lenses).

- + Compact LED construction
- + New possibilities for product design



High energy efficiency

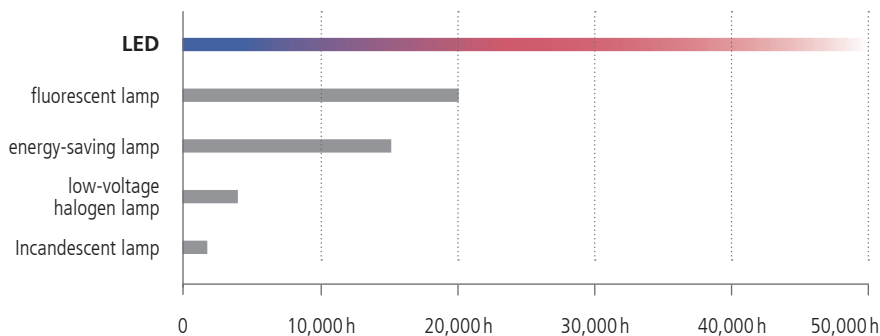


## 2. High operating efficiency

The high operating efficiency of Sharp LED Lighting products is a result of high system efficiency (lm/W), long service life and thereby low installation and maintenance costs. Lighting control systems and intelligent integration of lighting technology in spaces promise further possible savings.

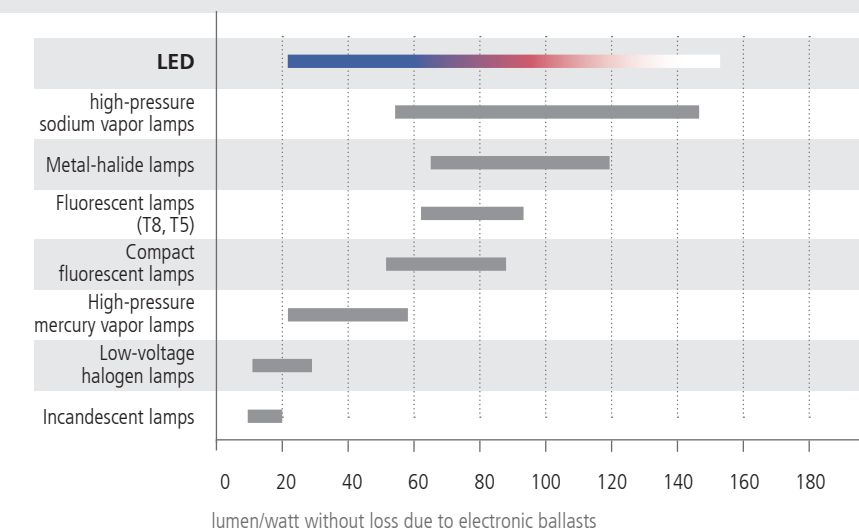
### Long service life

Sharp LED luminaires have a service life of over 50,000 hours – that adds up to six years of continuous operation or 25 years with 250 8-hour working days. LEDs work for up to 50 times longer than incandescent lamps. This extremely long service life minimizes maintenance costs. LEDs' high vibration resistance also helps to extend their service life. Conventional lamps service life decreases when frequent switching occurs. Whereas LEDs are perfect for lighting controls: The service life will always be the same, no matter how often they are turned on and off.



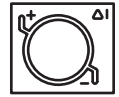
### High energy efficiency

Compared to other light sources, LED technology is already very efficient and has great potential for further improvement of lighting efficiency (lm/W). Compare the energy conversion of incandescent lamps with that of LEDs and the difference becomes even clearer. With incandescent lamps only 5% of energy is converted to light; with LEDs, this rises up to 40%.



LED technology up to

**40 % light**



incandescent lamps

**5 % light**



LED service lifetime

**25 years**

(running 8h/day and 250 days/year)

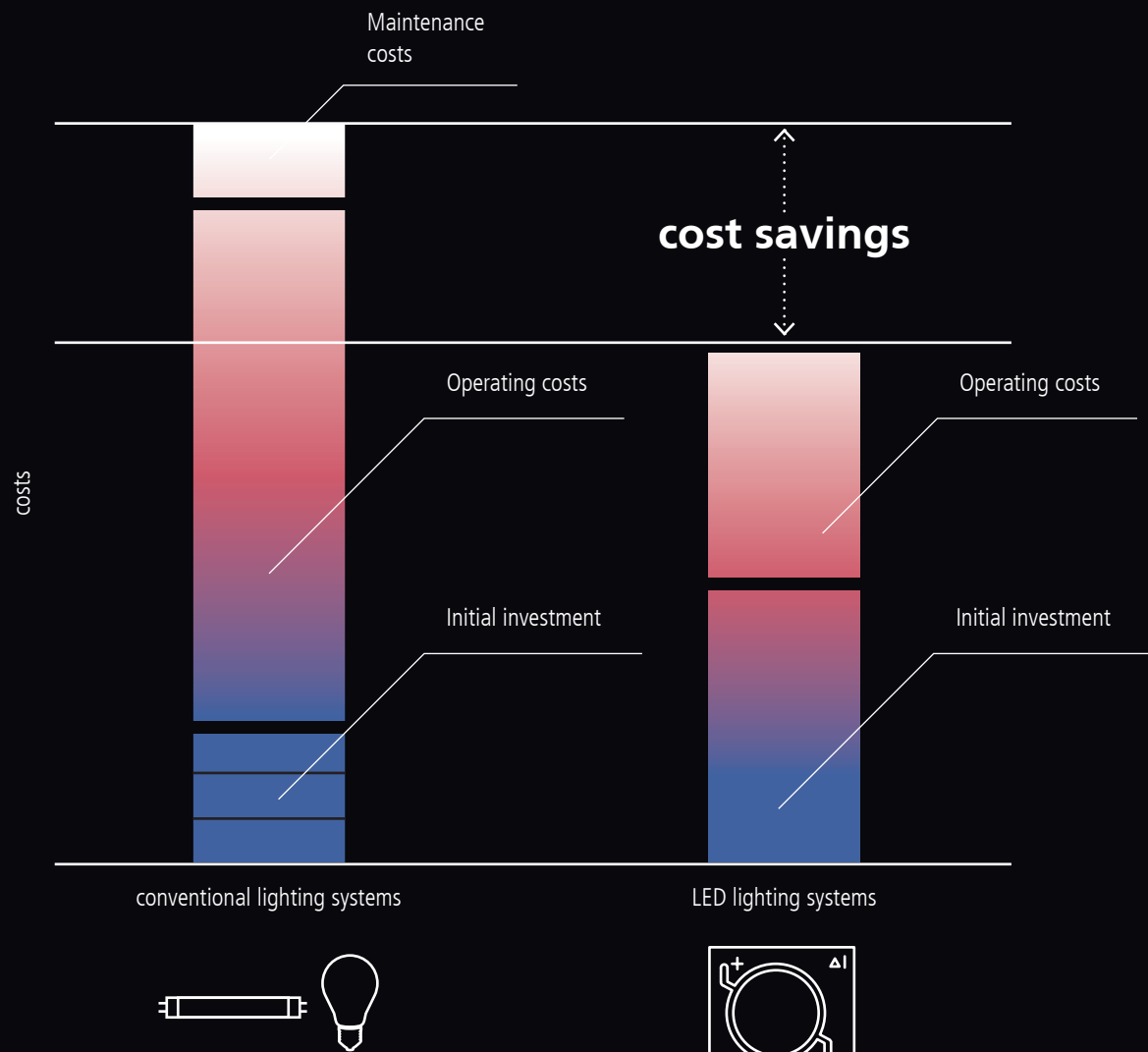
+ Long service life

+ No maintenance costs

+ High vibration resistance

+ High energy efficiency

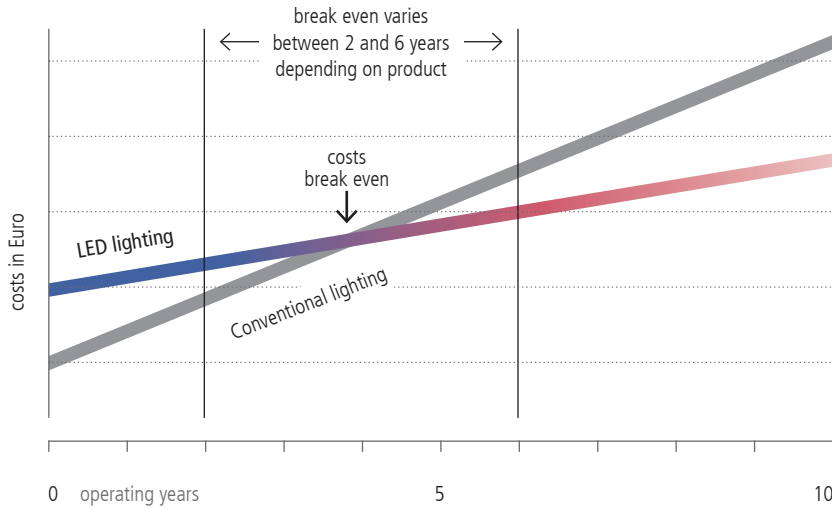
## Potential for savings





### Amortization over time

The comparatively high investment costs of LED luminaires usually amortize over their service life.



- + no UV or infrared radiation
- + attracts less insects
- + mercury free
- + conserves natural resources/  
reduced CO2 footprint

### Potential for savings

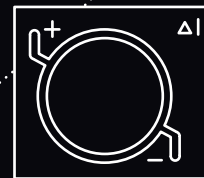
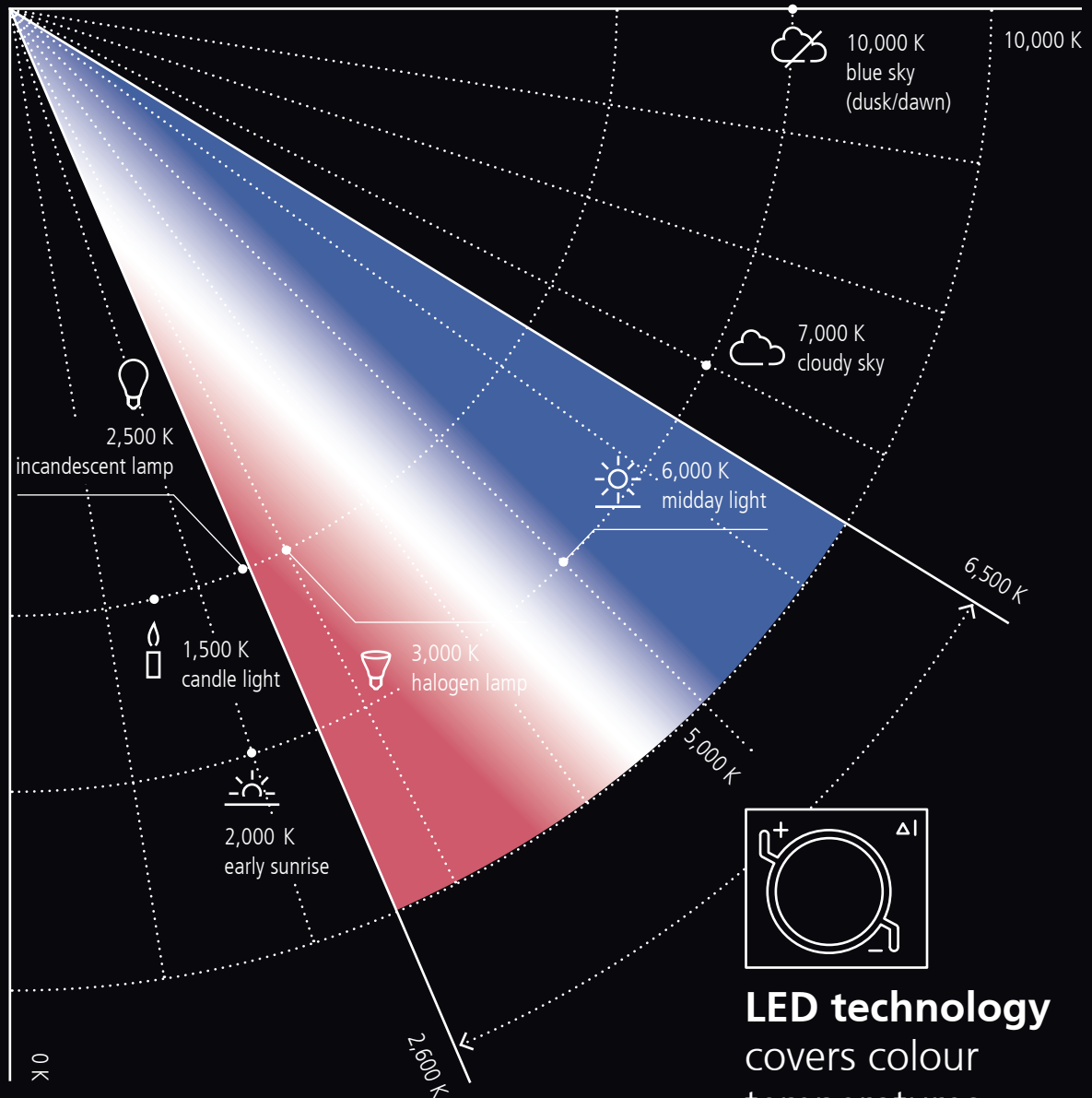
One fifth of all energy generated worldwide is used for artificial light.

Replacing conventional lighting products with LED technology using intelligent lighting management can reduce the amount of energy consumed by lighting products by 70%. ([www.licht.de](http://www.licht.de), licht.wissen 17)

### 3. Eco-friendliness

Due to its high energy efficiency, LED technology conserves natural resources and thereby significantly contributes to the reduction of the carbon footprint. No mercury is used for LEDs and LEDs do not produce UV or infrared radiation. Moreover, LED luminaires attract less insects than other lighting technologies.

## Colour Temperature



**LED technology**  
covers colour  
temperatures  
from warm white  
to daylight white

### 4. Optimal lighting design

LEDs have many advantages in lighting design compared to other light sources. White and coloured light can be generated and the correlated colour temperature of white LEDs is variable from warm white to daylight white. Warm white light can, for example, help create a relaxing evening mood, whereas daylight white can increase concentration while simultaneously reducing energy consumption.



Tunable white: 2,700 K



Tunable white: 5,700 K

In addition to their correlated colour temperature, our LEDs also achieve a high Colour Rendering Index. A high CRI is beneficial e.g. for the natural rendering of surfaces, skin or textiles. Sunlight compasses a colour rendering up to 100%. Currently, Sharp LED chips achieve up to 93 CRI, which is more than most other lighting technologies.



High CRI (Ra)



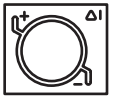
Low CRI (Ra)

Further advantages of LEDs are their ability to direct light very efficiently and provide their maximum luminous flux immediately after being switched on. High quality LED luminaires can guarantee high visual comfort.

- + Variable colour temperature
- + Colour Rendering Index up to 93
- + Light can be directed efficiently
- + Flicker-free light output on power-up
- + High visual comfort

sunlight up to  
**100 CRI (Ra)**

Sharp LED  
**93 CRI (Ra)**



# This is Why

[www.sharp.eu/lighting](http://www.sharp.eu/lighting)

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