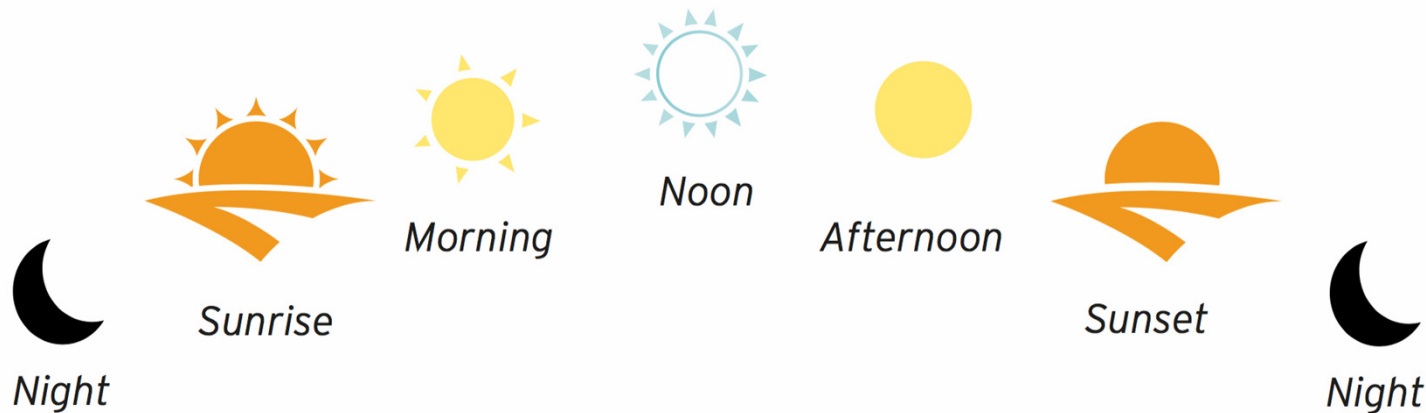


# Human Centric Lighting

Lighting designed to  
benefit human health and wellbeing



**Natural light is dynamic** from sunrise to sunset

Mankind has evolved under this light - dark cycle.

**24 hour rhythms dominate much of what we are:**

- There is a world in the 24 hour rhythms and with changing seasons
- The eye links light and darkness with the body
- **Intensity, color, timing and direction** are very important in circadian lighting

# Our daily world



**Artificial light is fixed** from wake-up to go-to-sleep



On a sunny day people outside get  
**100 000 lux**



On a clouded day  
**10 000 lux**



Indoor in offices people get  
**500 lux**



And in school only  
**300 lux**



People spend  
**90%**  
Of their time indoor

# The problem

Today there is a **disconnect** between natural and artificial light with regard to intensity, color and dynamics of light



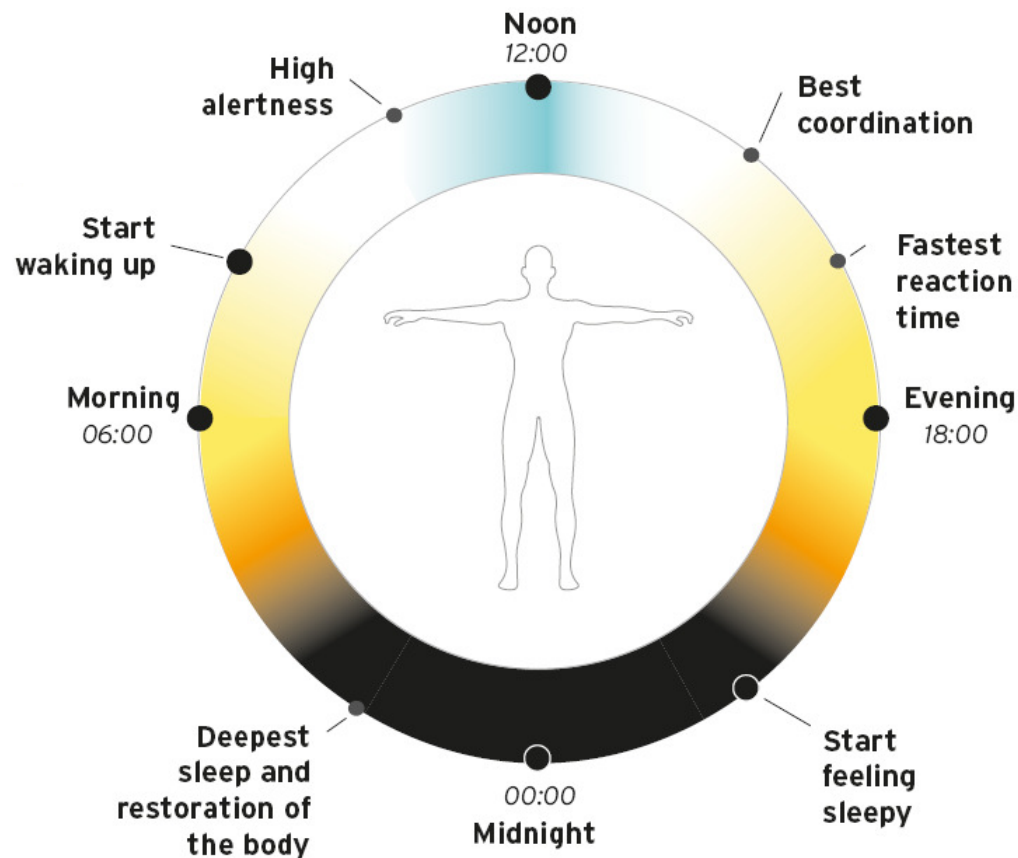
## Consequences

- Poor circadian entrainment, problems with body clock similar to jet-lag.
- Problems with sleep & alertness.
- Disturbance of the hormone system.
- Compromised mood, functioning, well-being and health....

# What do we need

## We need light and darkness

There is a period of the day when we are active and a period when we are sleeping  
Light is the most important timer for our internal clock



# The impact of light

## Light has an effect on



### **Vision**

*Sight*



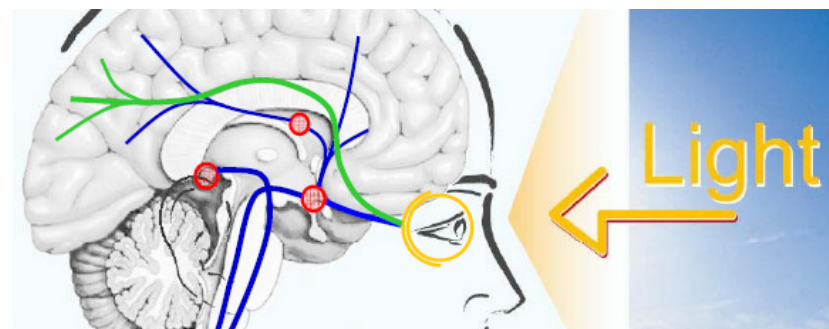
### **Body**

*Alertness,  
Cognitive  
Performance  
and sleep/wake  
cycle*

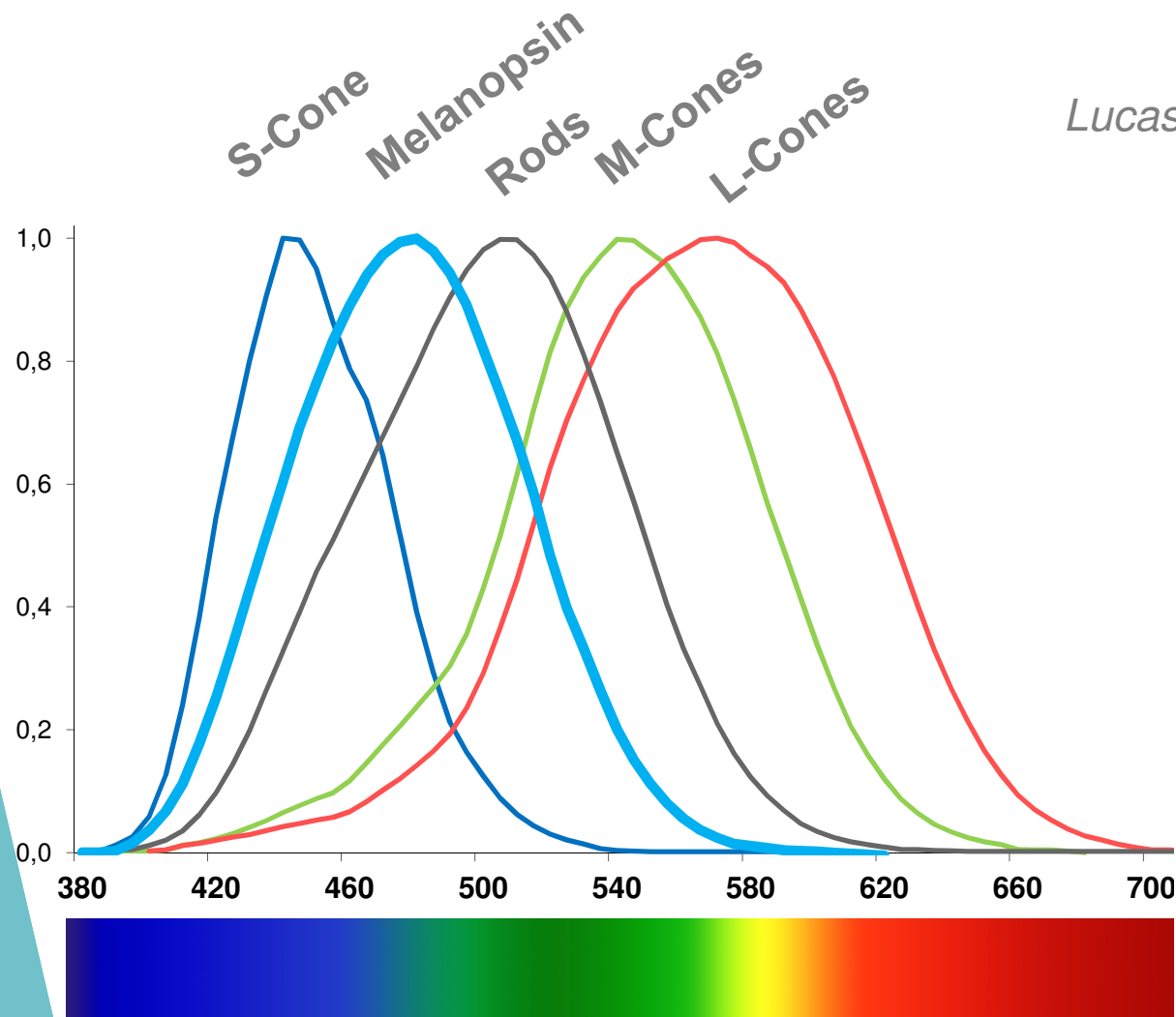


### **Emotion**

*Mood, energize  
and relaxation*



# The metrics



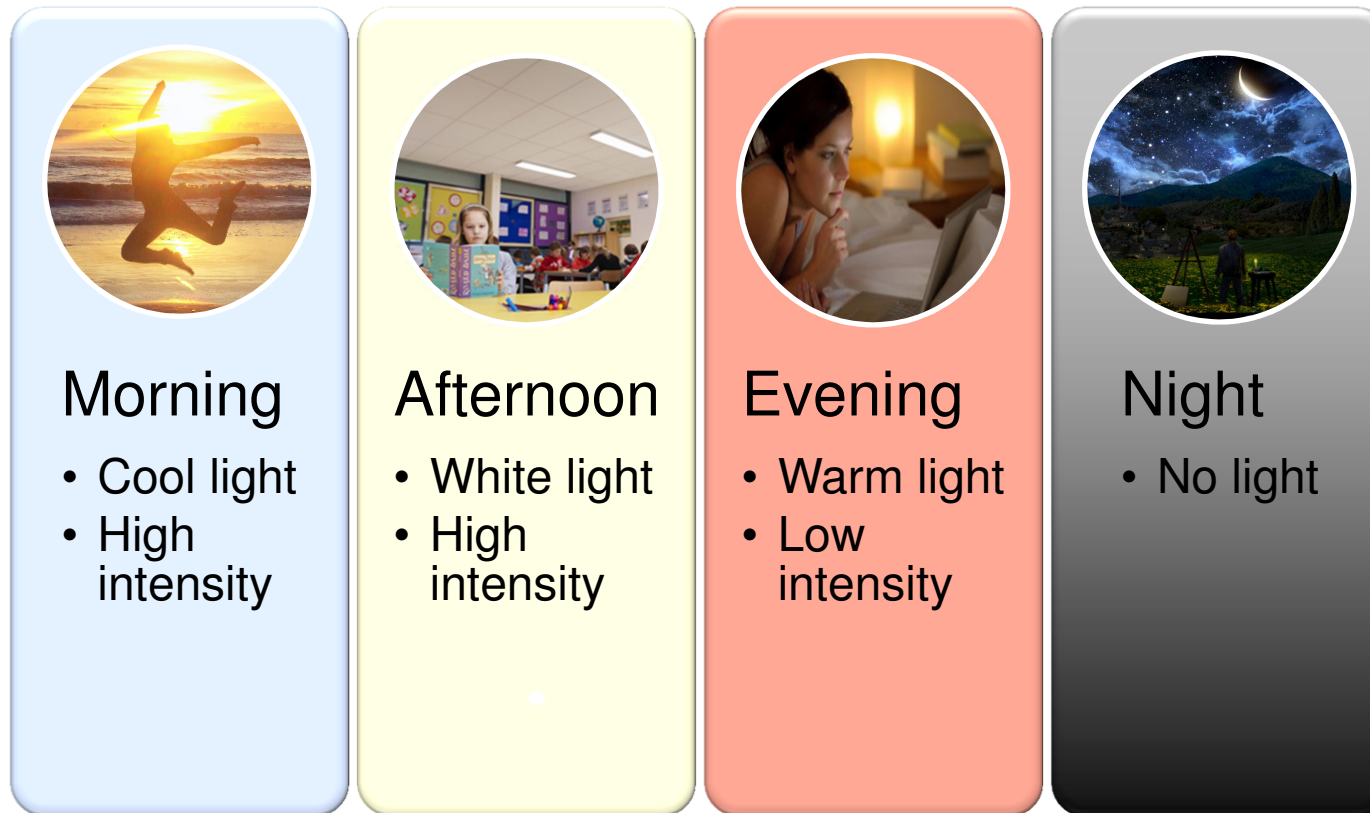
*Lucas et al. Trends. Neurosci. 2014*



*normalized data from CIE TN 003 (2015)*

# The solution

We need the right light at the right place at the right time to support our activities



Put value in people and go beyond energy efficiency



# Light in applications

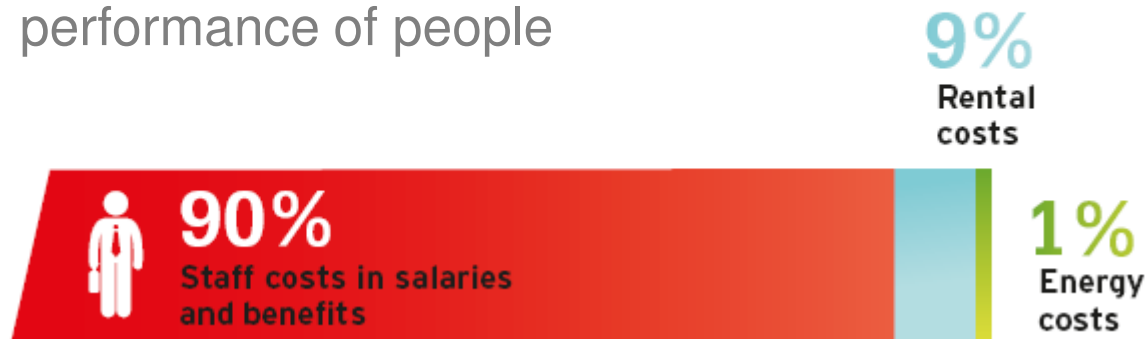
Light needs and settings vary per application



We need the right light at the right place at the right time to support our activities

## Look beyond energy efficiency

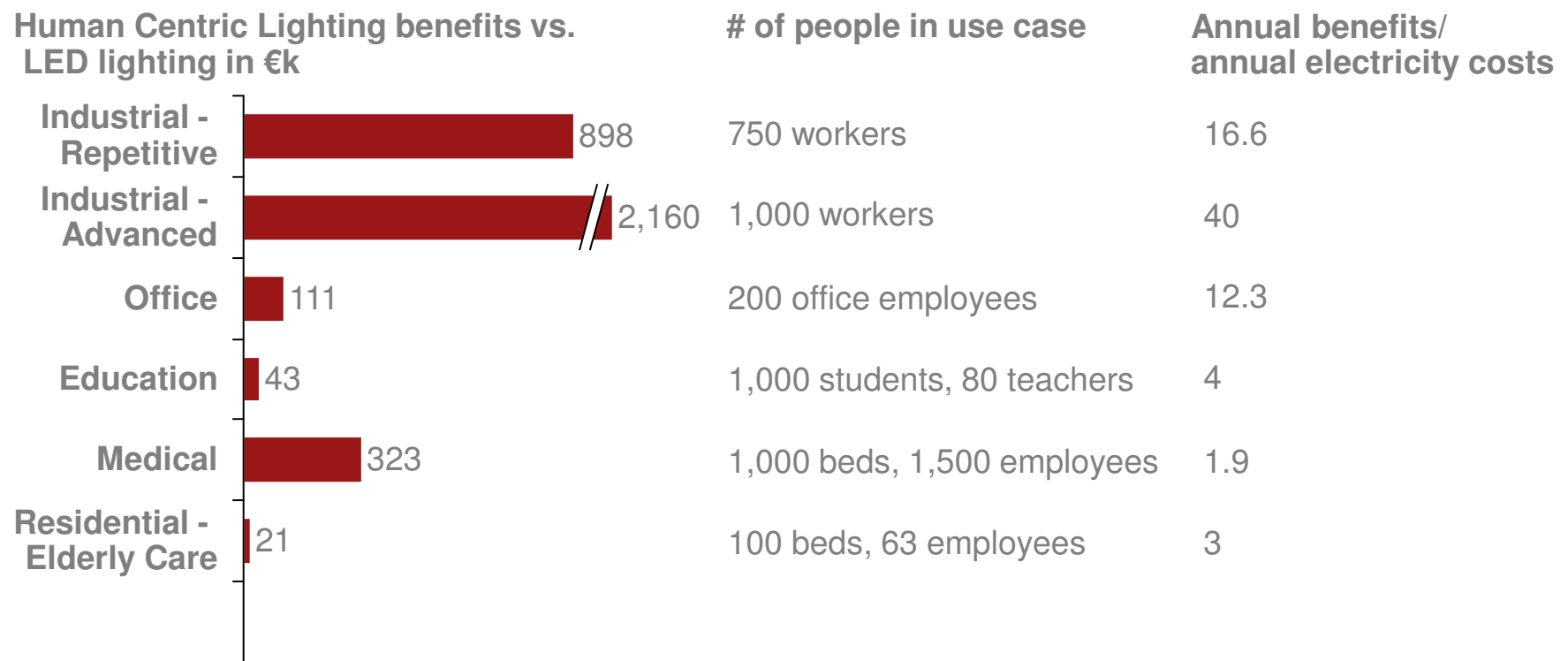
Human Centric Lighting increases the vision, well-being and performance of people



*If cost of energy is only 1% of the typical business operation costs, why do we concentrate on energy savings and not on having healthier, happier and more effective people?*

## Micro level benefits of Human Centric Lighting

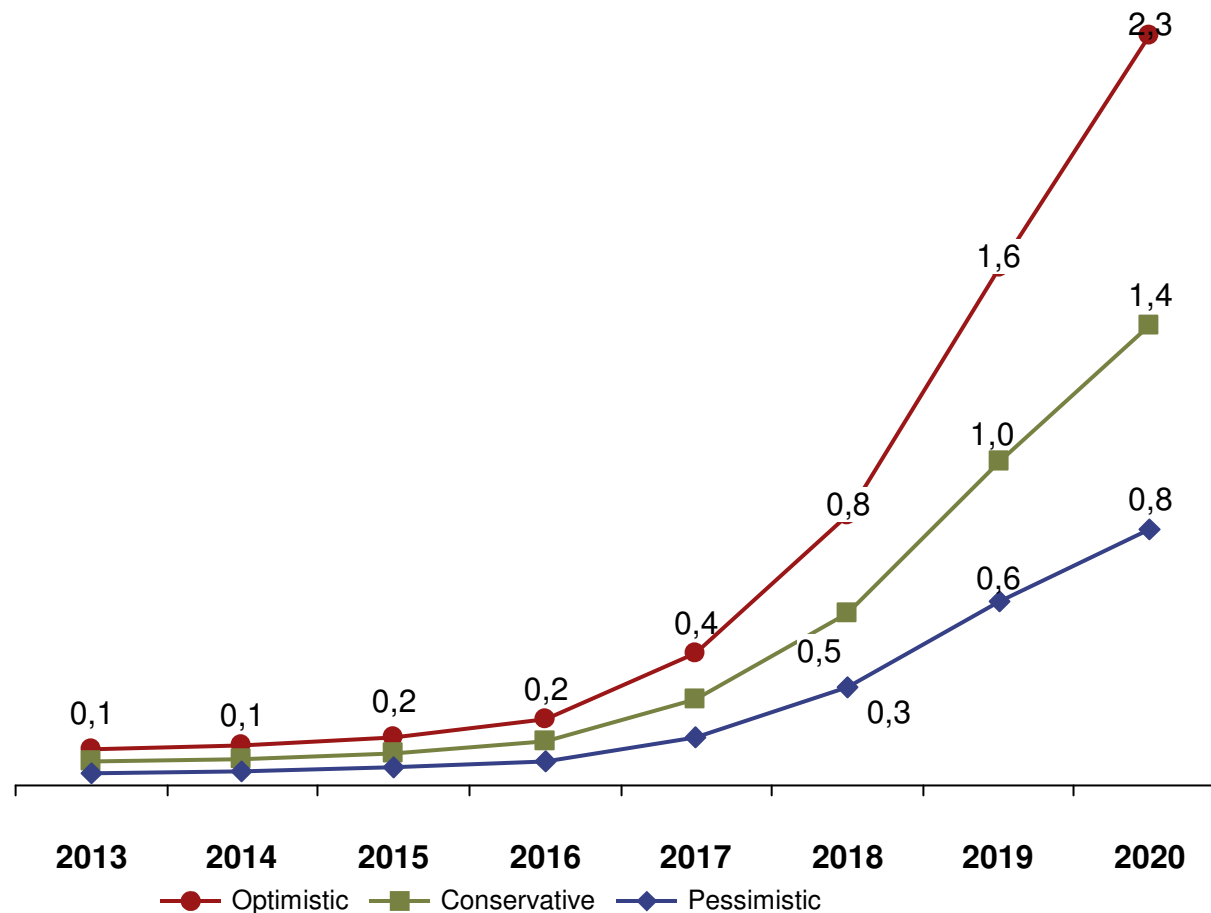
Highly sensitive to assumptions<sup>1</sup>



On the micro level, the most significant effects from Human Centric Lighting are realized in industrial segments.



## Human centric lighting can be a multi-billion-euro business in Europe



1. Human centric Lighting  
2. Indicated chart values until 2017 are for scenario with high growth  
Source: A.T. Kearney "Light and Health" market model

- **Optimistic scenario** assuming
  - Resolution of economic crisis
  - Significant infrastructure investments
- **Conservative scenario** most probable, assuming
  - Selective government support
  - Joint industry initiatives
  - Considerable marketing investments
- **Pessimistic scenario** assuming
  - Worsening of economic crisis
  - Little infrastructure investments

# More information

If you want to be part of this, become a member of



More information on Human Centric Lighting also at  
<http://lightingforpeople.eu/>





**LIGHTINGEUROPE**  
THE VOICE OF THE LIGHTING INDUSTRY

**Thank you for your attention!**