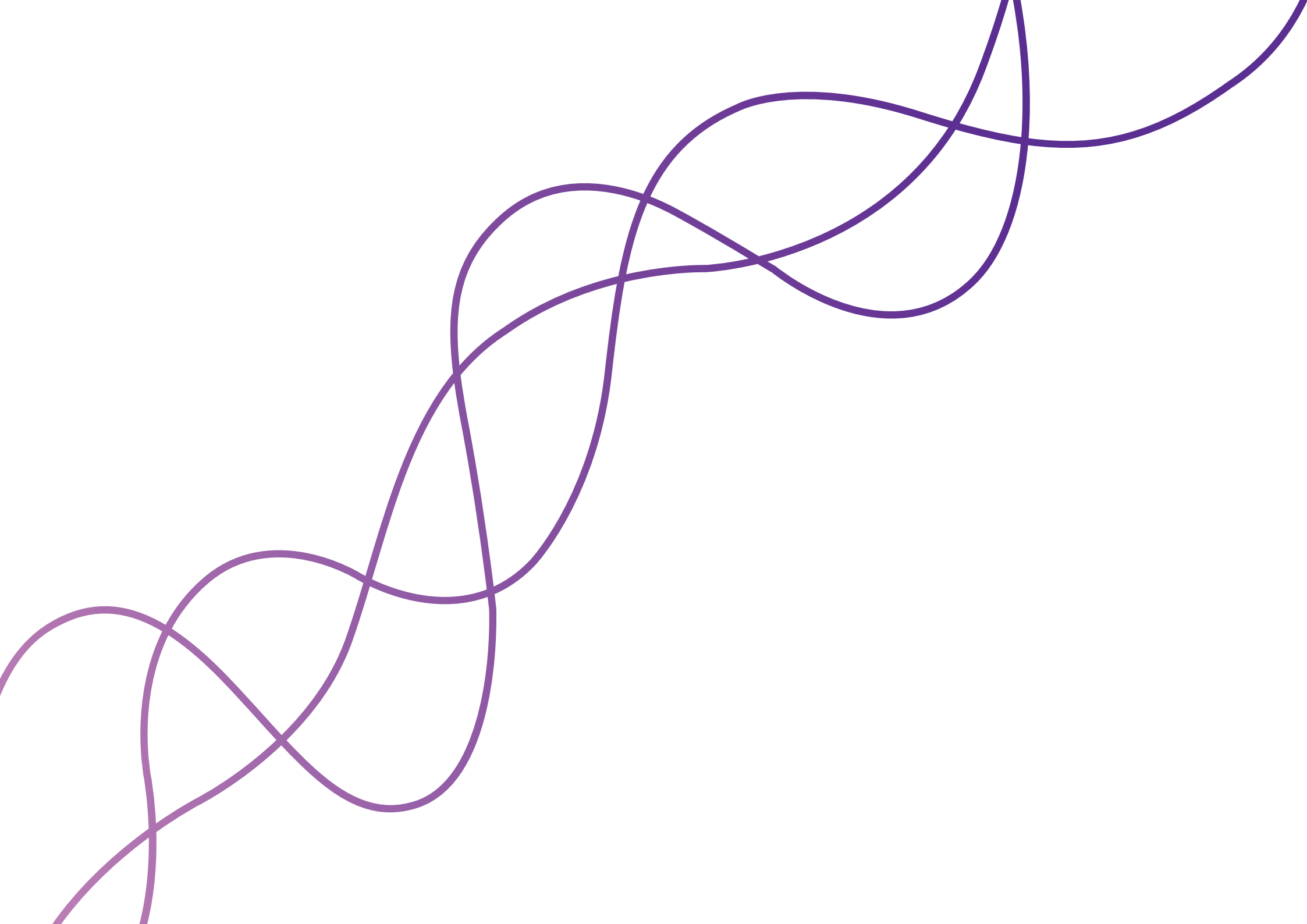
LUMENIA
INTERIOR

LIGHT MATTERS. MORE THAN YOU THINK

Switch on Human-Centric Lighting for improved health, wellbeing and productivity.

www.lumenia.com



Light, whether natural or artificial, affects all life on our planet. From the day's first rays of sunshine, the twinkling of stars, to bonfires, mobile phones and street lamps – it's everywhere. Its impact on people has been studied by scientists for decades, with their discoveries showing it affects our well-being and health much more than most people realise.

WHY LIGHT MATTERS

A basic distinction when categorising a light source is whether it is natural (produced by the sun) or artificial (created by incandescent bulbs, fluorescent tubes or light-emitting diodes (LEDs)).

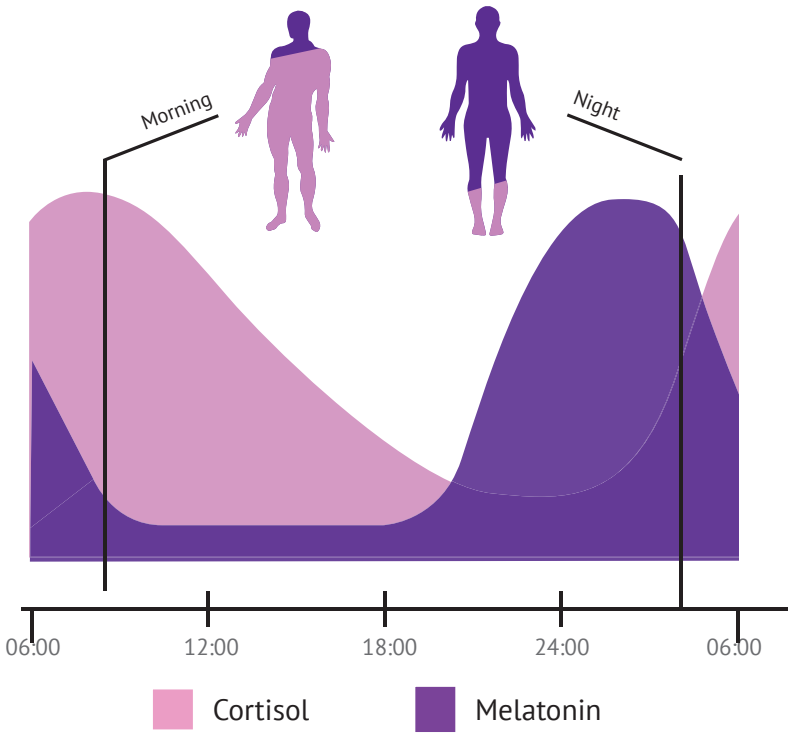
Natural light is believed to have the optimal impact on us. In the past, Persian soldiers already found that natural light has a healing effect on human bodies in terms of quicker post-fight recovery, when exposed to daylight. These days, science has developed knowledge about how light from the sky affects human bodies and human hormones. The oscillation of melatonin and cortisol hormones produces a healing effect by improving our body's immune system. This happens within a 24-hour period and is called the Circadian clock or internal body clock.

Modern life provides many ways to disrupt this rhythm. Nowadays, most of us experience very little change in the type of light we are exposed to, since we spend up to 90% of our time indoors. We live, work and play beneath uniform and consistent artificial light such that our bodies are no longer subject to the natural rhythms we have become accustomed to throughout human history.

HOW TO SYNCHRONISE OUR BIOLOGICAL CLOCK

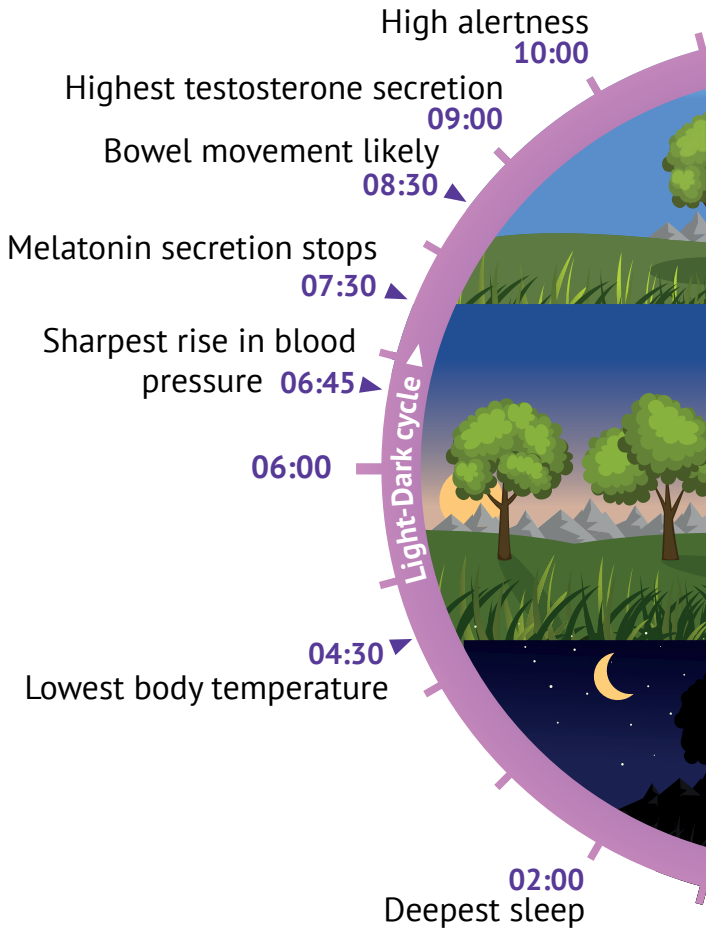
Circadian rhythm is the natural cycle reminding the human body it's time to get up, sleep, eat or heal. It is controlled by a part of our brain called SCN (Suprachiasmatic nucleus). It corresponds to signals received from our eyes. The retina contains two photoreceptors (cones and rods), that allow humans to view images, so we may call them photoreceptors for image-forming effects. At the start of 20th century, a third photoreceptor iPRGC (Intrinsically photosensitive retinal ganglion cells) was also discovered, consisting of melanopsin, which is photosensitive. These ganglion cells send the information about daytime, dusk or night time directly to the SCN.

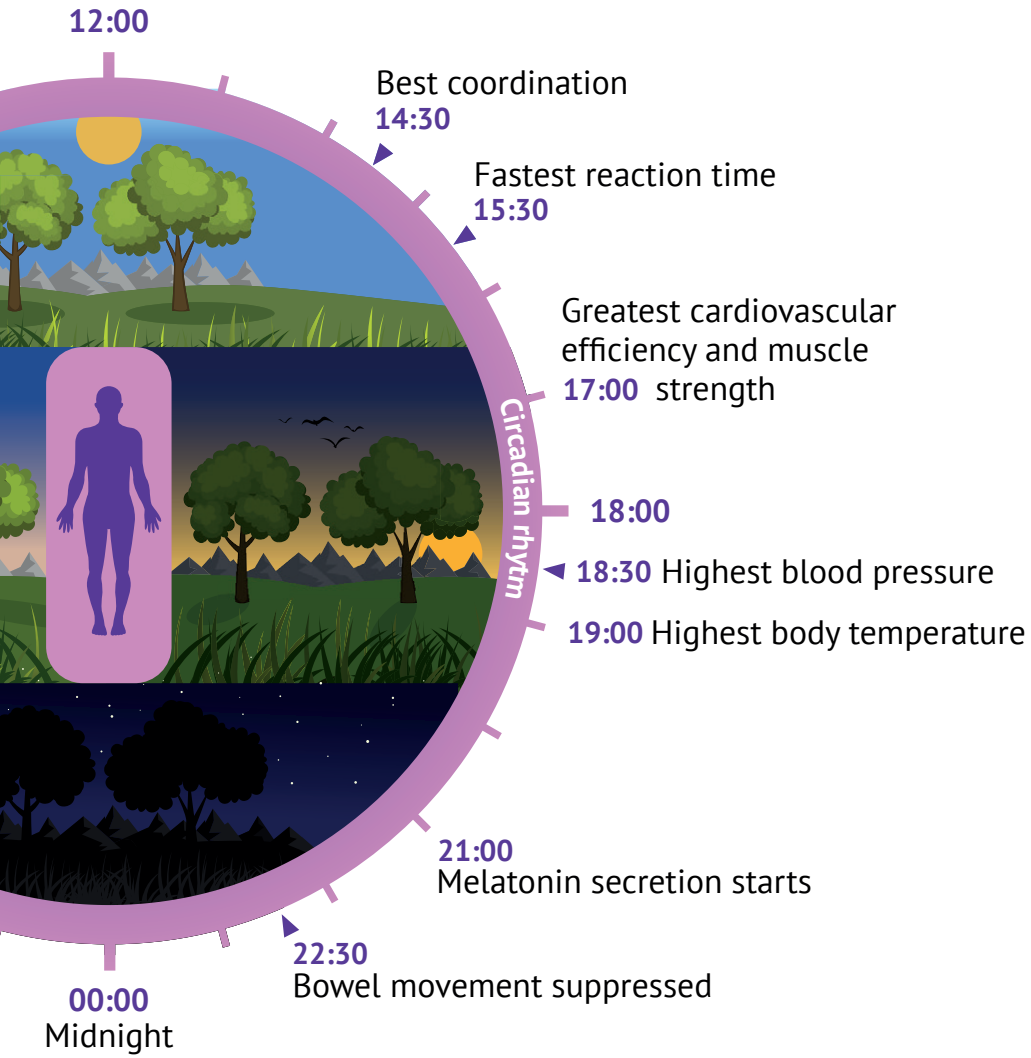
At dusk, our eyes receive less light than during the day. The week signals are no longer able to suppress melatonin, so it starts to develop again. Because melatonin is a sleeping hormone, we need a high level of it during the evening and at night. On the opposite, the stress hormone cortisol must be at a minimum in that period. To keep the body clock in order, we need to suppress the development of melatonin in the morning and keep it at this level throughout the day, stimulating the body for daily activities.



Maintaining regular sleeping habits and being exposed to the right light at the right time ensures our circadian rhythm works optimally and establishes a good mood, while strengthening our immune system.

Our sleep-wake cycle.





NOT EVERY LIGHT SOURCE IS THE SAME

For many years, the primary focus of interior lighting was to provide illumination that supports mainly image-forming functions such as visibility, minimising glare and shadows.

Although the third photoreceptor was discovered years ago, only recently have studies revealed the impacts on non-image-forming functions, like alertness, emotions and biological timing. These functions help light to regulate body functions such as our sleep-wake cycle, immune responses, appetite, and body temperature.

Proper light is therefore very important for our health and well-being. Not every light source is the same, something easily seen when looking at the spectral composition of light. The old technology (like incandescent or fluorescent light sources) meant we were unable to control that part of light, but with LED we can precisely determine wavelengths of the light spectrum. The energy emitted in narrow blue wavelengths (455–490 nm range) is energy emitted into the space which has the best impact on the circadian rhythm. When choosing an artificial light source, it is not only the design of the lights that is important, but the spectral composition and distribution of light as well.

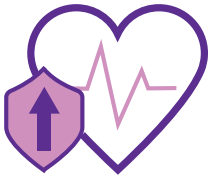
MAKING LIGHTING HEALTHIER

Exposure to the light from the sky or proper artificial LED sources brings many positive effects for the human body. But how do we know if we are not sufficiently exposed to such light? How to distinguish between a suitable proper and unsuitable light source? What are the consequences? One of the biggest effects is a disrupted circadian rhythm that cannot be observed in the short term but can happen over a few months, even years. The most common symptoms are linked to insomnia, depression, SAD (seasonal affective disorder), poor mental performance, weight gain, breast cancer, immune system not properly developing, and so on.

In response to the negative aspects of existing artificial lighting, a new topic in artificial lighting has started to emerge - Human centric lighting (HCL). HCL 'mimics' daylight during the day and creates the best possible conditions for people staying indoors. By providing visual, biological and emotional benefits, Human Centric Lighting solutions can support the human circadian rhythm, enhance concentration, prevent sleeping disorders and improve overall well-being.

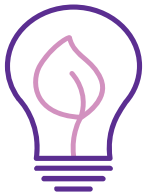
The arrival of HCL is made possible by all the knowledge gained about light's biological effects along with recent innovations in the area lighting technology. LED lamps are not only able to adjust light colour temperature on demand, but also the intensity or amount of luminous flux throughout the day.

BENEFITS OF HCL



IMPROVED HEALTH AND SLEEP

GREATER PRODUCTIVITY AND ENHANCED PERFORMANCE



ENERGY SAVINGS AND SUSTAINABILITY

IMPROVED SAFETY

VISUAL ACUITY

Morning: 5500K with lower intensity to start the day.

Midday to evening: Intensity increases through the morning. Peak intensity is reached at approx. 2pm.

Evening: Intensity is slowly decreasing towards evening. The colour temperature also changes from 5500K to 3000K.

Lighting fixtures with HCL change their light throughout the day, bringing daylight indoors via artificial light.

Implementation of CIRCADIAN technology luminaires at Izola Elderly Care Centre. The development comprises 60 flats ranging from 36–59 m2 in size, common public spaces, garages and a garden.

The lighting in the centre should fit the seniors' lifestyle and visual capacity, while promoting active and healthy living. It should stimulate the tenants for activities during the day, while supporting restful sleep at night, thereby improving their wellbeing.

The facility was equipped with 68 SKY LUM Wall, 187 SKY LUM Ceiling, and 168 SKY LUM Pendant luminaires.

HUMAN CENTRIC LIGHTING APPLICATION AREA

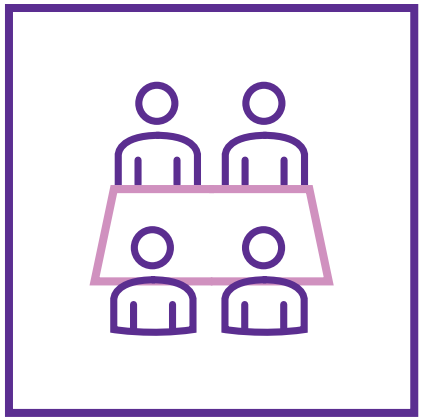
SCHOOLS AND UNIVERSITIES

Light quality substantially impacts academic performance. A sharp mind is important for good concentration during lessons. It doesn't matter if someone is at primary school or at university, the benefits of an optimised lighting environment can be observed both direct and indirectly.

When children arrive at school, a cold white light is important for preparing them for lessons and increasing concentration, which can be achieved by stimulating the stress hormone cortisol and suppressing the sleep hormone melatonin. These light conditions greatly impact test exam results and longer ability for concentrated reading. During rest periods, lunch or when a teacher wishes to create relaxing atmosphere or calm the children down, a warmer light should be used. Short exposure to warm light will not disturb their circadian rhythms, but will affect their emotions and comfort.

The ability to change the spectrum composition and intensity of lighting during lessons can help maintain a stable circadian rhythm and thus improved sleep-wake behaviour. Sleep is also an important factor for many learning processes and with enough quality sleep, attention and concentration levels during school hours rise.

OFFICES AND MEETING ROOMS



Appropriate workplace lighting not only provides sufficient light to perform work-related visual tasks, but also positively affects employees' alertness, mood, cognition, sleep-wake pattern and health. Guidance for how to create a sustainable office environment is described in the WELL building standard where lighting solutions like SKYLUM are highlighted.

When considering typical building operating costs, we soon realise that employee costs make up the biggest share compare to equipment, heating, rent etc. This makes it very important to enhance the good employee experience through healthy buildings. By providing proper artificial light at the right time, HCL helps with an individualised boost of concentration and energy, stronger employee motivation and commitment, as well as increased work performance, alertness and employee health. With the biological clock in order, the immune system develops itself, ensuring better protection against the cold or diseases.

The worst effects of improper lighting are seen with shift workers. These workers are found not only in industry, but also among healthcare staff (such as nurses). A proper light-spectrum composition in such cases helps improve health by keeping the circadian clock in order.

HUMAN CENTRIC LIGHTING APPLICATION AREA

MEDICAL FACILITIES AND RESIDENTIAL CARE

Patients and elderly people have higher demands for the quality and quantity of light since their bodies must cope with immobility, injuries, pathologies and age-related tissue degeneration. A problem of medical facilities and nursing homes is that they are often purpose-made for hygiene, cleanliness and safety, but overlook the fact that light sources produce substantial glare due to shiny floors. Inappropriate light during the night disrupts not only sleep, but also the timing of the body clock, with negative consequences for cognition and emotions. HCL promotes a natural and regular circadian rhythm, thus positively affecting immune defence and supporting good and healthy sleep.

RESIDENTIAL

Recent developments in lighting technology enabled the production of new LED products that offer ambient lighting solutions that allow the customer to change the light's colour temperature and intensity. However, these new smart light devices are regarded as life-style products not related to health issues, with the non-image forming effects of light neither considered at all nor implemented. HCL in the home environment holds great potential to support circadian physiology, cognitive performance and sleep quality.

THE WELL BUILDING STANDARD

Launched in October 2014, the WELL Building Standard (WELL) offers a framework to help improve health and well-being for everyone who visits, works in, or experiences a particular building. It is the first of its kind to focus solely on health and wellness, with 10 different categories making up the Standard: Air, Water, Nourishment, Light, Fitness, Temperature, Sound, Materials, Mind and Community. Each category in the standard is broken down into several features.

In LIGHT category, WELL provides illumination guidelines that minimise disruption to the body's circadian system, enhance productivity and support good sleep quality. Among all the features, Circadian light design is the most highly valued. Since we spend approximately 1/3 of our life at work, maintaining pleasant and healthy workplaces is a big factor in employee attraction and retention. Moreover, 90% of corporate expenses are tied to salary and benefits, suggesting it makes common sense for companies to invest in people and help to improve their physical and mental health. The ROI of healthier and happier employees extends to cost-savings, too.

By obtaining a WELL Certification, employers can demonstrate their commitment to employee wellness and design spaces that may assist in attracting a sought-after workforce. It also acts as a signal to the world that you put people first.

LUMENIA LUMINAIRES EQUIPPED WITH CIRCADIAN TECHNOLOGY

SKY LUM PENDANT

MAIN FEATURES
System efficacy of up to 104 lm/W
Direct and indirect light distribution
Multi colour temperature
Light spectrum
Slim design

DURABILITY
Lifetime of more than 50,000 h
Latest LED design with special light spectrum
Easy maintenance

SKY LUM PENDANT 1200

SKY LUM PENDANT 600

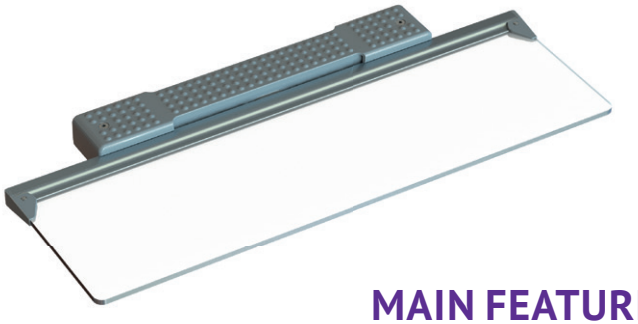
MECHANICAL FEATURES
Powder-coated aluminium housing
Direct and indirect optics
Compact design
Ingress protection level of 54

SMART
Bluetooth controllable connection
DALI Type 8 compatible

OPTICS
Color rendering index (CRI):
5500 K CRI<90 and 3000 K CRI >85,
4000 K CRI>85
Unified glare rating (UGR) < 16

LUMENIA LUMINAIRES EQUIPPED WITH CIRCADIAN TECHNOLOGY

SKY LUM WALL & CEILING



MAIN FEATURES

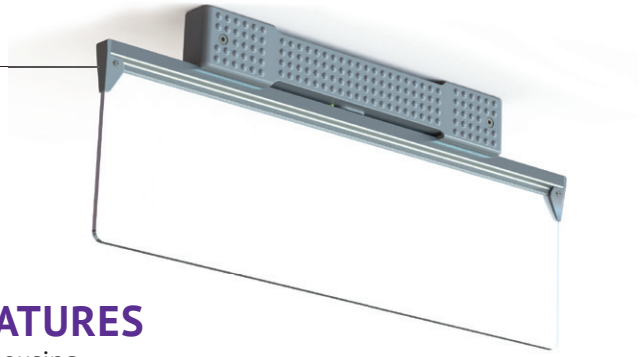
System efficacy of up to 95 lm/W
Light spectrum
Direct and indirect light distribution
Slim design
Multi Colour Temperature

DURABILITY

Lifetime of more than 50,000 h
Latest LED design with special light spectrum
Easy maintenance

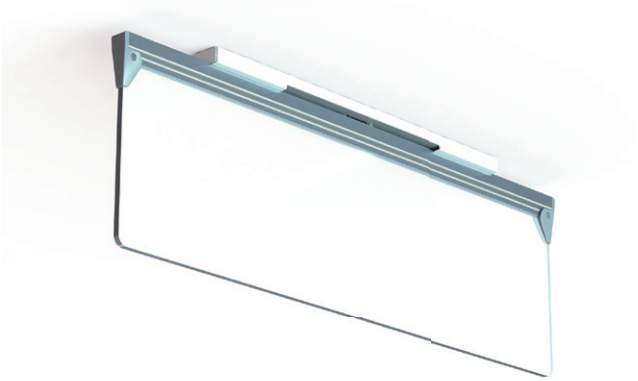
SKY LUM WALL

SKY LUM CEILING



MECHANICAL FEATURES

Powder-coated aluminium housing
Compact design
Ingress protection level of 54



OPTICS

Color rendering index (CRI) HCLC 5300 K CRI<90,4000 K CRI>80
Sky LUM Wall - Unified glare rating (UGR) < 16
Sky LUM Ceiling - Unified glare rating (UGR) < 19

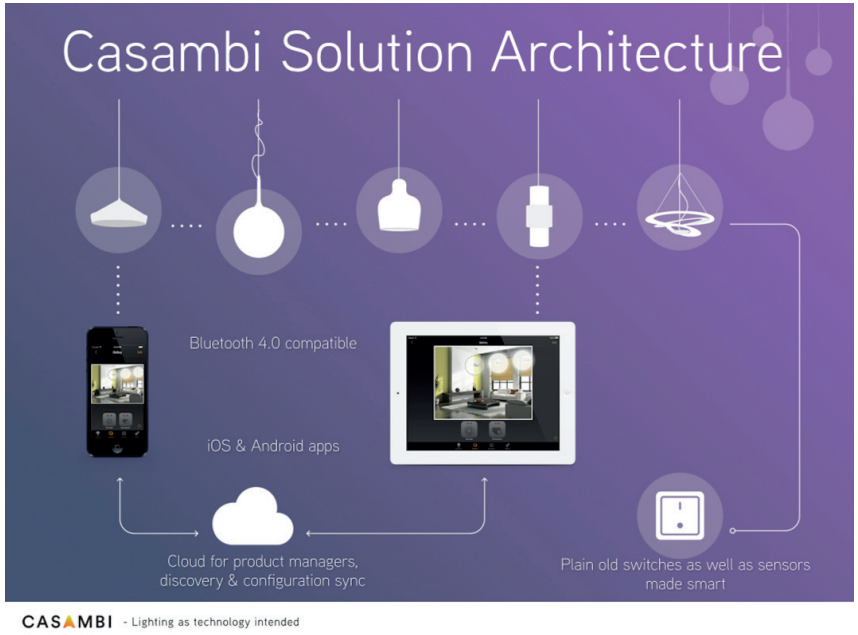
OUR LIGHTING CONTROL SYSTEMS

DALI TYPE 8

- An electrical installation with 5-core wiring- for power supply and the DALI communication bus
- Colour temperature calibration
- Allows you to change the light's colour temperature and intensity
- Able to connect to DALI central management systems for controlling luminaires in bigger facilities (e.g. more than 128 luminaires)

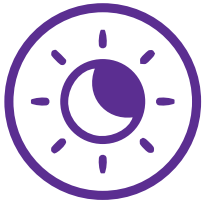
CASAMBI BLUETOOTH MODULE

- Wirelessly controllable
- No need for an external gateway device
- Smart phone acts as an access point (Android/IOS)
- Allows you to group luminaires or control them individually
- Automatically forms a fast wireless mesh network
- Suitable for offices with up to 127 luminaires



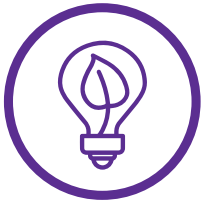

CHOOSE HUMAN CENTRIC LIGHTING. CHOOSE HEALTH.

It is time for Human Centric Lighting



Circadian Rhythm

Mood



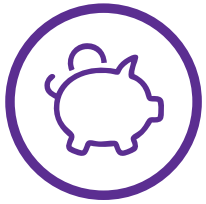
Energy Savings & Sustainability

5-year Warranty

Attractive Design

Improved Productivity

Visual Acuity



Low Maintenance Costs

Designed and Manufactured in EU

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