



©signify

Support wellbeing  
with BioUp





# Light has impact beyond the visual aspect

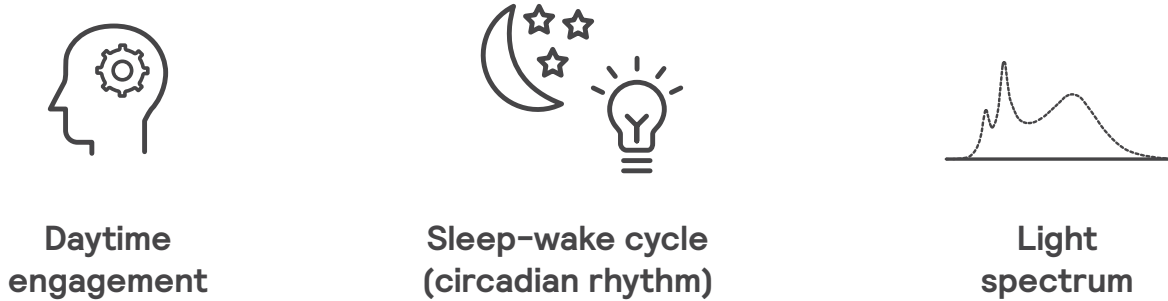
We have become the indoor generation. On average, we spend more than 90% of our time indoors, with 36% of that spent in the workplace.<sup>1</sup> But the more time we spend indoors, the less we're exposed to the beneficial effects of natural daylight.

Light has a **visual impact** that helps us see well, a **biological impact** that helps us perform well, and **emotional benefits** that help us feel well. The combination of these elements is essential for wellbeing and the foundation for circadian lighting.

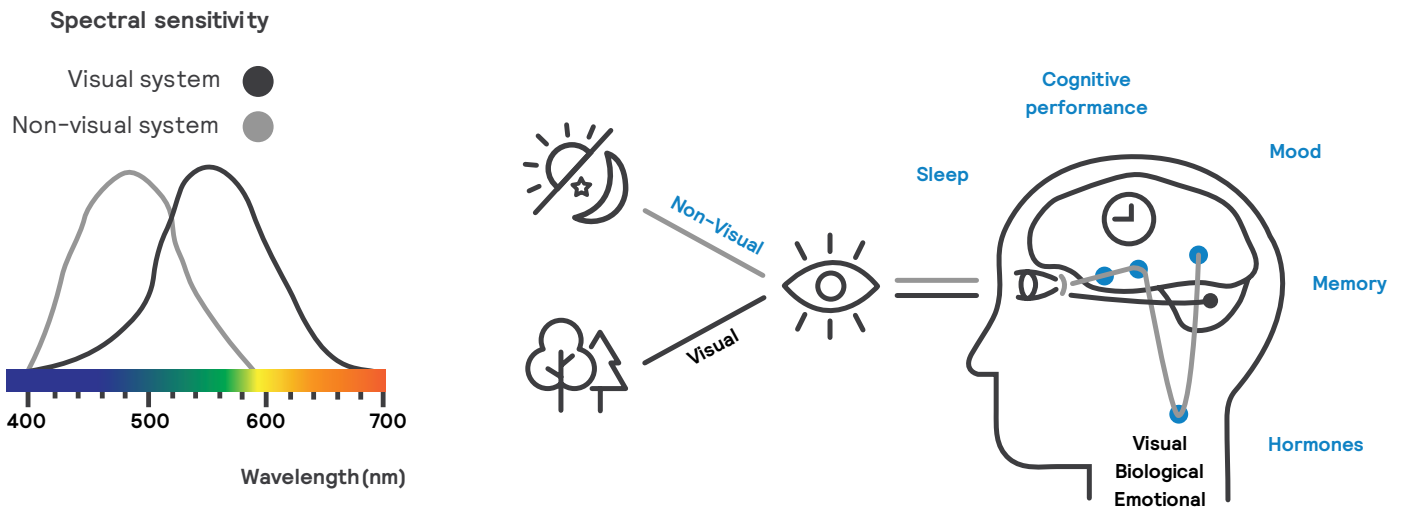
Although the biological effects of light help determine our general wellbeing, indoor light levels are generally tuned to the visual functions of light. Today it is imperative to consider the non-visual aspect of light to help support the biological impact. Designed with the non-visual aspect of light in mind, BioUp, a spectrally tunable technology, mimics daylight and is designed to deliver melanopic benefits to people indoors with limited exposure to natural light.

# Benefits of melanopic light

Melanopic light plays a major role in synchronizing the internal body clock with non-visual effects of light. When you properly design melanopic lighting in your building, it can bring the benefits of natural daylight indoors, supporting **visual comfort, wellbeing** and **performance**. Melanopic light has a direct relation with<sup>2</sup>:



## Non-visual aspects of light



Source: Schlangen, L.J.M., & van der Zande, B. M. (2022). The power of healthy daytime lighting in indoor settings: melanopic lighting advances and office applications (Version 1). Zenodo. <https://doi.org/10.5281/zenodo.7362816>

At the beginning of the 21st century, it was discovered that photoreceptors in the human eye –photosensitive retinal ganglion cells or ipRGCs – contain melanopsin, which is highly sensitive to the blue wavelength. When melanopsin is stimulated by light, the ipRGCs send a signal (non-visual path) to the body’s internal clock, subsequently ensuring that our bodies are synchronized to the 24-hour day-night cycle supporting daytime engagement and sound sleep patterns.<sup>3</sup>

1. Impact of Windows and Daylight Exposure on Overall Health and Sleep Quality of Office Workers: A Case-Control Pilot Study, 2014.  
2. <https://www.assets.signify.com/is/content/Signify/Assets/philips-lighting/global/20210520-brochure-melanopic-light.pdf>  
3. <https://www.assets.signify.com/is/content/Signify/Assets/philips-lighting/global/20220826-the-power-of-healthy-daytime-lighting-white-paper.pdf>

# What is BioUp?

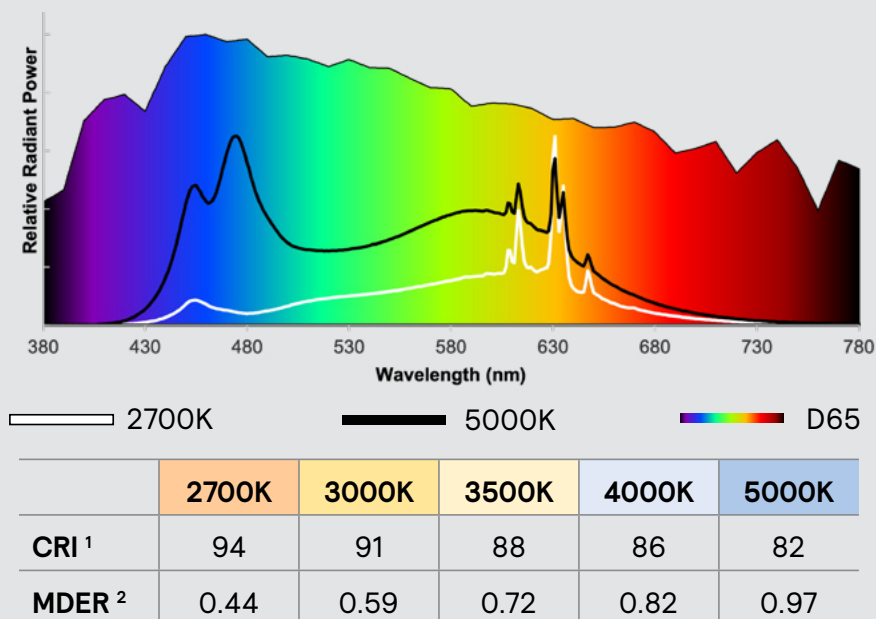
BioUp is a spectrally tunable technology allowing for minute adjustments to certain wavelengths in the LED light spectrum. By enhancing the LED spectrum with cyan light, BioUp helps to support the biological impact. You may not see the impact of BioUp on the visual color or intensity of light, but you can experience the impact on how you feel and perform.

BioUp mimics elements of natural daylight that are visually imperceptible but profoundly impactful. It achieves a high Melanopic Daylight Efficacy Ratio (MDER) value at cooler CCT levels while maintaining high efficacy. This produces a spectral content close to that of natural daylight.

## What differentiates BioUp:

- Higher Melanopic-DER of up to 0.97: more melanopic light per lumen
- Higher Melanopic-DER\*LER: more melanopic light per watt radiation for higher efficiency (up to 19% more)
- The ability to tune CCT with MDER values over a wider range, from 5000K at 0.97 to 2700K at 0.44, for better daylight simulation.

The graph below shows the cyan peak at 480 nm delivering optimal melanopic benefits. The table below shows the CRI and MDER values throughout the broad CCT range.



Representative data based on the Ledalite SyncLine product.

1. Color Rendering Index (CRI) is calculated in accordance with CIE 013.3-1995.

2. Melanopic Daylight Efficacy Ratio (MDER) is the measure for "spectral melanopic efficiency" as defined in CIE S 026-2018.

3. Standard daylight (D65) has an MDER value of 1.



## What is melanopic-EDI?

Melanopic equivalent daylight illuminance (melanopic-EDI), unit lux, is the circadian metric adopted by the International Commission on Illumination (CIE). It describes the response of the non-visual photo-receptors (ipRGCs) in our eyes. This response is indicative of how the body will respond and is a combination of the spectrum and intensity of the light.

## What is MDER?

The melanopic daylight efficacy ratio is a spectral metric of the biological effect of an artificial light source or artificial light sources compared to daylight (6500K). Biological effects of melanopic lighting include impacts to your energy, your sleep quality, your mood, and more. The melanopic-EDR of a reference daylight spectrum is 1. Typically, artificial lighting has a lower biological effect than daylight, the MDER being below 1.

# Lighting and the WELL Building standard™



In the WELL Building Standard, the concept 'Light' covers nine features, one of which is Circadian Lighting Design (L03). This provides guidelines on ways to minimize disruption to the circadian system, enhance productivity, support relaxation and provide appropriate visual acuity. Previously, industry standards accounted only for horizontal lux, which measures task lighting that shines on a flat surface such as a desktop. The new approach considers vertical lux, light that shines vertically and enters the pupil at eye level directly impacting our melanopic response.

To receive points towards the WELL v2 standard, you must achieve 250 lux M-EDI (D65) at eye level for a period of at least four hours per day.

<sup>1</sup> World Green Building Council. Health, Wellbeing & Productivity in Offices: The next chapter for green building. 2014

<sup>2</sup> Miller NG, Pogue D, Gough QD, Davis SM (2009) Green buildings and productivity JOSRE 1(1):65-89

<sup>3</sup> Guy R. Newsham, Jennifer A. Veitch & Yitian (Vera) Hu (2018) Effect of green building certification on organizational productivity metrics, Building Research & Information.





# Light up interior environments with BioUp

- Dynamic, 480 nm, cyan-enhanced LED spectrum can provide optimal melanopic benefits at typical indoor CCT levels
- Supports daytime circadian rhythm for engagement during the day and good sleep quality at night
- CCT range (2700K – 5000K)
- CRI of 82-94 throughout the range
- R9 value of 62-76 throughout the range
- Wired and wireless control options: Interact, 0-10V, DALI, other third-party controls
- Can contribute towards WELL v2 Circadian Lighting Design points by achieving 250 lux M-EDI (D65) at eye level for a period of at least 4 hours per day
- Available on select Ledalite, Day-Brite and Alkco products; see our website for current product offerings.



# BioUp-Enabled Lighting with Connected Technology

Light has a visual impact, a biological impact and emotional benefits. The combination of these elements is essential for people's well being and the foundation for human-centric lighting.



## **Build well**

Increase your building's appeal and achieve WELL Building Certification.



## **Feel well**

Lead the way to healthy, more engaging workspaces with personalized lighting control.



## **See well**

Improve comfort and light levels with LED lighting.



## **Perform well**

Help everyone thrive at work with the right light at the right time during the day.



## More lighting flexibility with Tunable White

Tunable white solutions offer the freedom to create different ambiances in offices, schools, retail spaces, and healthcare environments.



### Dynamics

Automatically mimic daylight patterns by adjusting color temperature and brightness levels with respect to the time of day.



### Scene set

A combination of predetermined presets instantly sets the scene for room ambiance that supports the next scheduled task or spontaneous activity.



### Personal control

Get more flexibility and easily change LED intensities and correlated color temperature (CCT) from warm white (2700K) all the way to cool white (6500K).

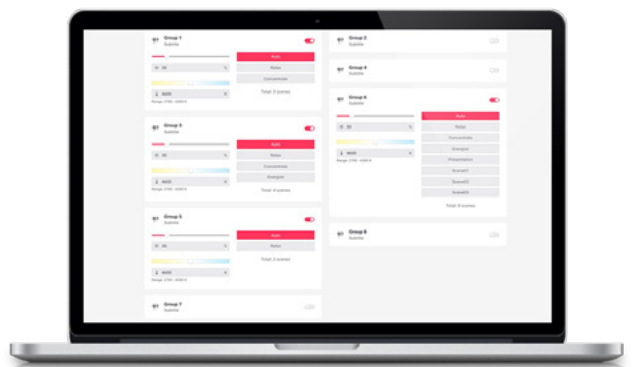
# interact

## Wireless Connected Lighting



## Capabilities of Interact Ready Lighting

- Create wireless scenes with light level & color temperature (CCT)
- Flexibility to tune your CCT levels from from a smartphone app, wall switch, or the software dashboard
- Support luminaire integrated occupancy and daylight sensors
- Read CCT driver range and automatically determine max and min CCT levels



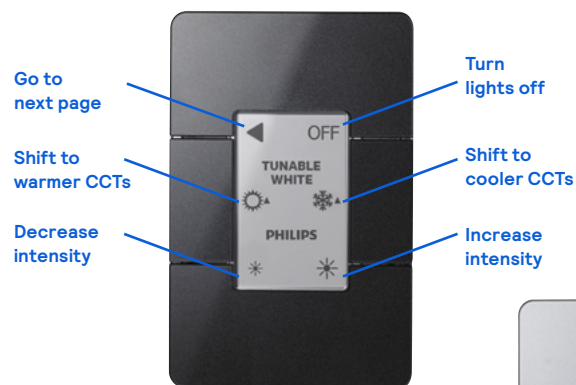
# PHILIPS dynalite

## Wired Connected Lighting



## Capabilities of Philips Dynalite

- Multi protocol support-DALI, 0-10V, phase dimming or DMX
- Choose design options with award winning Antumbra user interfaces for chic look and feel
- Independent functionality with distributed intelligence and no single point of failure
- Easily integrate with other subsystems in the building such as HVAC





© 2023 Signify Holding. All rights reserved. The information provided herein is subject to change, without notice. Signify does not give any representation or warranty as to the accuracy or completeness of the information included herein and shall not be liable for any action in reliance thereon. The information presented in this document is not intended as any commercial offer and does not form part of any quotation or contract, unless otherwise agreed by Signify.

Signify North America Corporation  
400 Crossing Blvd, Suite 600  
Bridgewater, NJ 08807  
Telephone 800-555-0050

Signify Canada Ltd.  
281 Hillmount Road,  
Markham, ON, Canada L6C 2S3  
Telephone 800-668-9008

All trademarks are owned by Signify Holding or their respective owners.