

Vitasolis™

Optisolis™

2-in-1 Tunable LED



# Light **so** Good: Illuminating office spaces

A guide assessing the current trends in office lighting and its future direction  
with special thanks to:

**BDP.**

**LIGHTINGEUROPE**  
THE VOICE OF THE LIGHTING INDUSTRY

**REGENT**  
LIGHTING

[www.nichia.com](http://www.nichia.com)

## INTRODUCTION:

**Office workspaces are not homogeneous; there is no standard aesthetic or layout that governs designers when they sit down to conceptualize a new work surrounding. In turn, there is no one-size-fits-all approach to office lighting.**

Modern-day office lighting schemes have many objectives to meet, not least delivering energy efficiency, sustainability and addressing the challenges posed by the circular economy. Of course, none of these ambitions can be achieved to the detriment of light quality.

Lighting has to be fit for purpose and meet user requirements; after all, the right lighting is often personal preference. Then there is visual appeal and creating an expression of workplace branding that speaks to both staff and clients. System intelligence is also climbing up the list of demands as users seek the gains that data analysis provides, while the growing popularity of human-centric lighting (dynamic lighting) should not be ignored by those looking to enhance staff productivity and wellbeing.

**Throw the shifting business landscape and rise of home working into the mix and there is much to consider for the future of lighting in office spaces.**





***2-in1 Tunable White LED for every day mode lighting.***

*NICHIA: A guide assessing  
the current trends in office  
lighting and its future direction*

## GOING BEYOND ENERGY EFFICIENCY:

The lighting industry is already harnessing the potential of 'LEDification' and sustainability to deliver significant energy efficiency and environmental benefits, and moving forward there is little doubt that energy savings will remain a major driver for office lighting designs. From a renovation perspective there remains much infrastructure that can still transition to LED, and there is regulatory push in support of that progression. Emerging rules in Europe will ban any remaining halogens by September 2021, for example. Moreover, the EC has just published a new policy that sets out the objective to double renovation rates over the next few years. It is estimated that around 75% of existing building stock is energy-inefficient as it was constructed before current legislation on performance. A further contributor to energy savings is effective lighting control, such as that provided by daylight, timing and occupancy sensors, which allow systems to react instantly to user requirements.

Clearly, however, there is a need for the office lighting of the future to go beyond energy efficiency, which many now take for granted. With this thought in mind, the real value of lighting to the sector and society will come from intelligent and dynamic systems.

Academia and the medical research community have clearly documented the biological impacts of light.

**Today, NICHIA technologies and products are available that can deliver those biological benefits indoors.**

**“** *We are convinced that human-centric lighting, fostered by intelligent systems, will be the next big thing for office buildings. People question the value of human-centric lighting and indoor environmental quality because they struggle to calculate the ROI.*

*However, employees represent 90% of operating costs for a typical business, and studies show that the performance of office workers increases by up to 12% when they are exposed to better lighting.*

**Ourania Georgoutsakou**  
Secretary-General,  
Lighting Europe



## NICHIA's 'Light so Good' range comprises

**OPTISOLIS™**, an LED with spectrum closest to natural sunlight without harmful UV emission.



**VITASOLIS™**, an LED with higher cyan levels than conventional LEDs to stimulate the body and help control human-circadian rhythm.



**2-in-1 tunable LED** technology allowing color tuning from 2700 to 6500K within a small, single light-emitting surface that achieves superb color uniformity and quality.

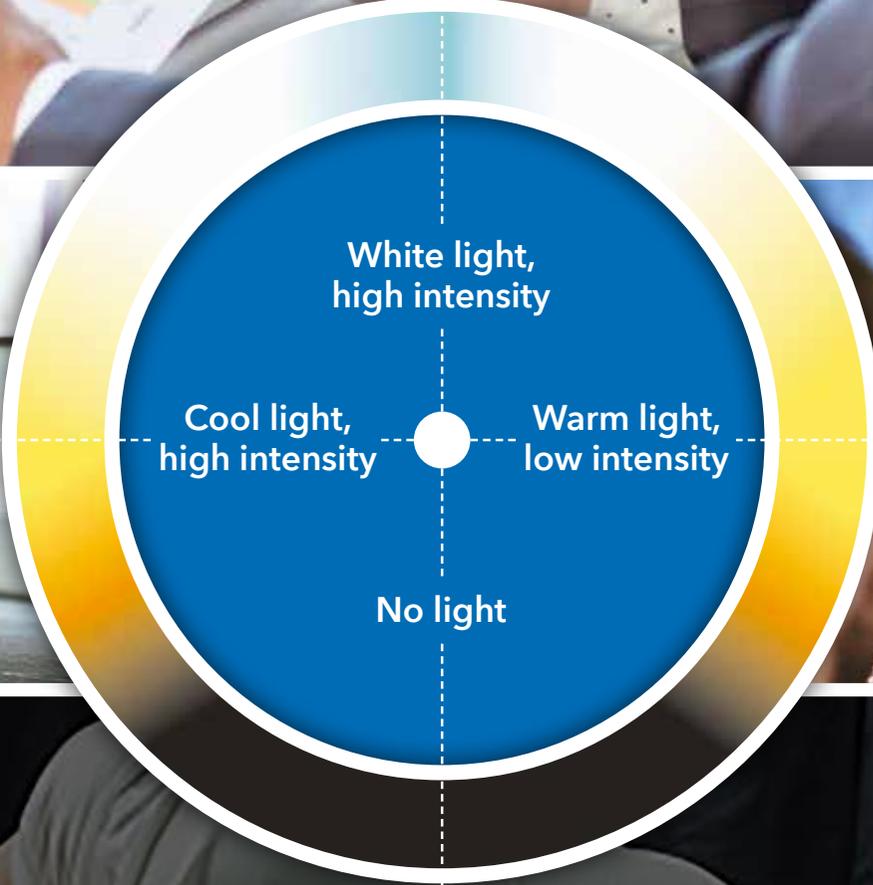




NOON



MORNING



EVENING



MIDNIGHT

**The Circadian Rhythm - human body clock.**

*NICHIA: A guide assessing the current trends in office lighting and its future direction*

## WHAT IS GOOD LIGHTING?:

When it comes to delivering quality light, there are few benchmarks to provide guidance. And while there is a standard for office lighting - 'EN 12464-1 Lighting of work places' - which sets out the minimum requirements for parameters such as color rendering, horizontal and vertical illuminance, illuminance uniformity, glare and color temperature, few designers will be encouraged by the word 'minimum'.



**To stand out from the crowd and make a difference, modern office lighting schemes must go beyond.**

Designers should address the core issues of safety, task requirements and occupant needs in a coherent and integrated manner to be successful in delivering quality light. Factors to consider include light levels and distribution, light source quality, the use of tuned and tunable lighting, personalization through control and, importantly, daylight.

Daylight is the most sustainable source of light; it is circadian in nature and has various disinfection properties. Most astutely designed office lighting schemes will comprise a combination of daylight, direct and indirect lighting, and individual task light.



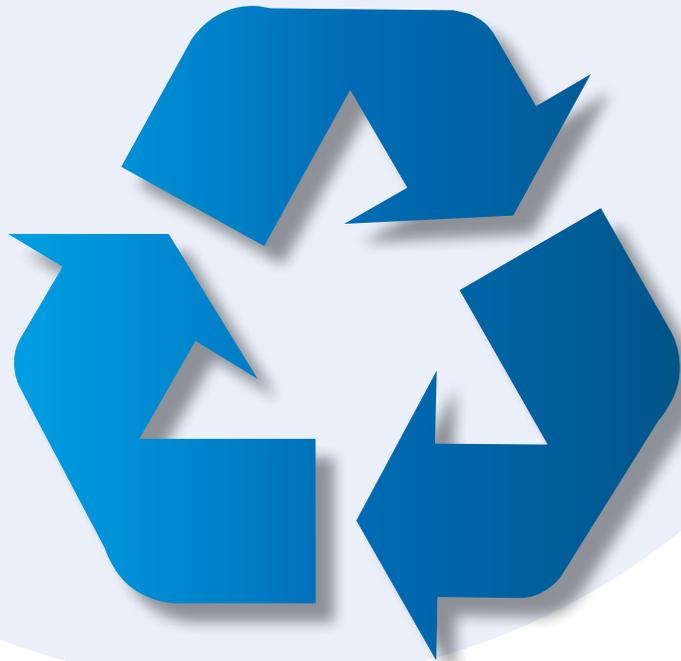
***2-in1 Tunable White LED for every day mode lighting.***

*NICHIA: A guide assessing  
the current trends in office  
lighting and its future direction*

## A SUSTAINABLE FUTURE:

Although technology is pivotal in any successful office lighting design, adopting a human perspective is also important when looking to answer questions about future trends. Analyzing the needs and concerns of office workers will set out the appropriate design principles.

Today, sustainability often tops the list of concerns. There is, after all, a climate emergency taking place and everyone has a part to play. Energy efficiency and CO2 reduction are naturally at the heart of most sustainability drives. Here, 'LEDification' has made a major contribution, of which the lighting industry can be proud. But there is some way to go, with renovation projects key to making the necessary in-roads. Effective lighting control and intelligent design can continue making a difference, particularly with the increasing use of wireless technologies and the emergence of data as a more influential aspect of the holistic office lighting solution.

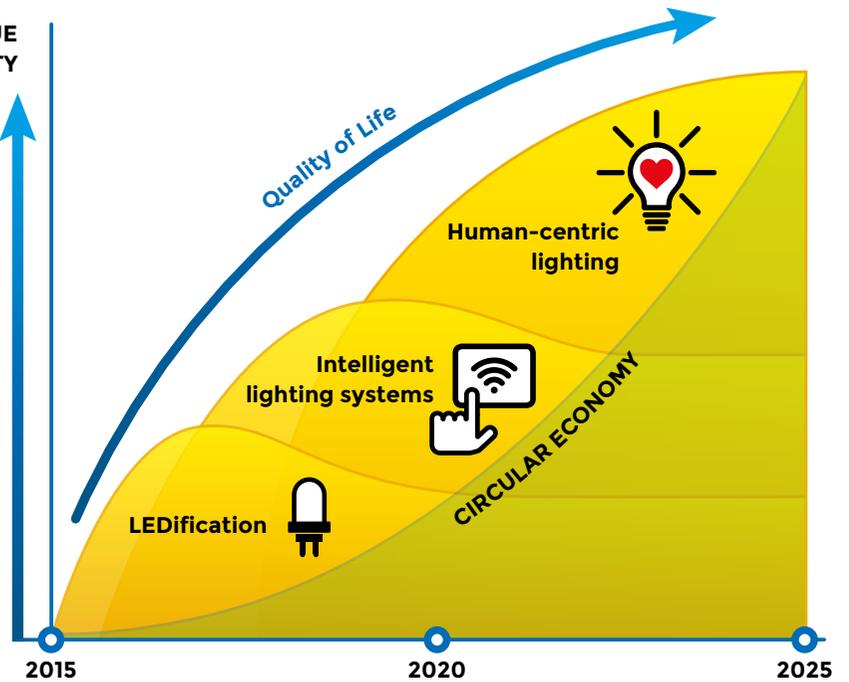


### GROWTH OF VALUE OF LIGHT TO SOCIETY

+ Light for well-being

+ Light for sustainability

Energy efficient light



Another sustainability issue is toxicity at end-of-life - there is much work to do on recycling, reusing and renewing - while beginning-of-life and resource shortage must also be considered. For instance, if current consumption rates continue, estimates suggest that copper could disappear as natural resource at some point between 2040 and 2050.

All of these factors lead to the circular economy debate and how it relates to the lighting industry. Designers must think about what a circular economy product looks like and the needs it should fulfill. By way of example, the sustainability trend could well drive the need for plug and play solutions that allow various lighting toolkits to be integrated with flexible infrastructure, so luminaires can be reused very simply at end-of-life.



“

*To apply any of these solutions, the contribution of LED and luminaire manufacturers will be vital in providing the tools that we need as designers to ensure that our vision - and the needs and desires of clients - are implemented.*

Mark Ridler  
Head of Lighting,  
BDP

”

***Sustainability issue regarding the toxicity with end-of-life technology.***

*NICHIA: A guide assessing the current trends in office lighting and its future direction*

## COMING AROUND TO THE CIRCULAR ECONOMY:

A truly sustainable lighting solution needs to be socially effective, environmentally responsible and economically feasible. There must be a balance between the energy consumed and the task that the lighting is required to perform. For instance, there is little merit in designing office lighting that blankets 400lx over the entire space. In any case, within typical workplaces, desk areas only consume about 30% of the floor area. Putting 400lx into a carpet is simply a waste of energy and usually serves to create a workspace that lacks personalization or culture.

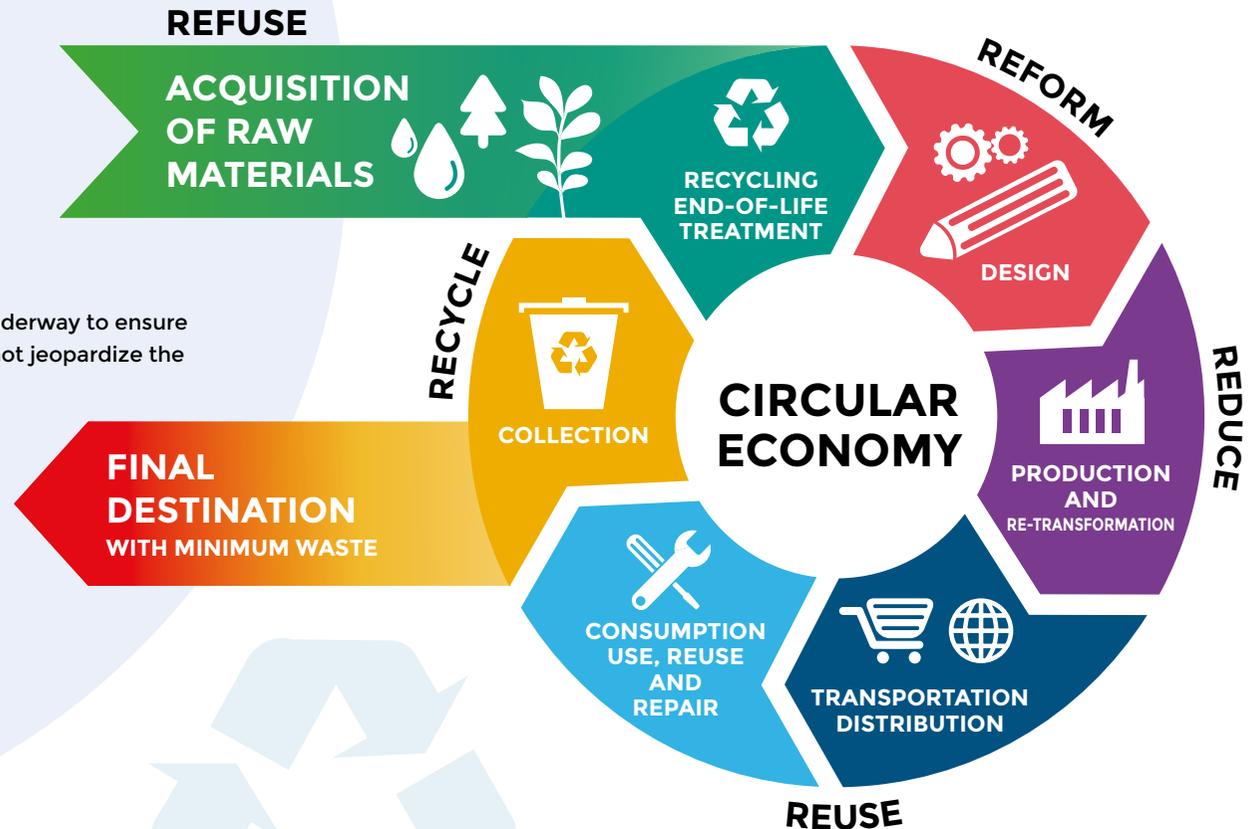
Getting good daylight into a space is essential, as is the use of lighting control technologies such as daylight harvesting sensors and presence detectors, as well as efficient LEDs and luminaires. Using these techniques and others will allow designers to remove 80% of a system's energy, while simultaneously creating a solution that benefits office workers by lighting in the optimum way.

Certainly the most energy-efficient lighting system is the one which is switched off, but that hardly serves the purpose. Even the regulators are carefully contemplating this dilemma. A review of European legislation is due in 2024 and preparations are already underway to ensure that any additional energy-efficiency requirements will not jeopardize the performance of human-centric lighting.

**Striking a trade-off between energy efficiency and light quality is the challenge, bringing it together with the circular economy.**

The circular economy has wide-ranging implications for the future of lighting. Using slimmer products, fewer components and recyclable materials, along with extending service life, all help reduce carbon footprint. But this concept is also about 'light miles': the length of supply chains; ensuring production takes place close to point of use; how much renewable energy is used during manufacture; and adopting an intelligent approach to packaging.

LEDs also have their part to play. Among the goals at NICHIA in relation to the circular economy is achieving higher CRI without compromising illuminance efficacy.





**Getting good 'daylight' into a space is essential.**

*NICHIA: A guide assessing the current trends in office lighting and its future direction*

## THE WORKPLACE/HOME OFFICE BALANCE:

National lockdowns due to the pandemic have accelerated the evolution of the office, although some of this was already underway. Increased homeworking has been a long-held future scenario, where certain technologies applied in the office can transfer to homes, such as task lighting, and tuneable white and anti-glare solutions.

Many agree that the demise of the workplace due to COVID-19 is overstated, but there is little doubt it will be reinvented, largely through the acceleration of existing trends. The immediate future will likely see a mixed economy evolve, with workers spending approximately half their time in the office and half at home.



**For certain, there will be a need for highly qualitative and versatile office lighting.**

There are fewer distractions at home and, with people spending less time commuting, productivity increases. On the flip side, office workers have a primal need to socialize with colleagues, a part of work life missed by many during periods of lockdown. One notion is that there could be a move away from open-plan office working, which can be distracting. In its place there might emerge more 'loose fit' meeting spaces that are less commercial in look and feel. This type of plug and play, highly adaptable collaborative space will prove ideal for colleague-to-colleague and colleague-to-client encounters.

If the only reason to visit the workplace is to see and speak with colleagues or customers, then the way that person is rendered to others becomes paramount. As a result, lighting must work better than before, perhaps focusing on task and ambient solutions, or better CRI, or maybe something completely new? It is less about generating 400 or 500lx at desk level, but more about volumetric light, where factors such as flicker, color, quality, distribution and glare become far more important.



*Working from home needs lighting to help with staying focused.*

*NICHIA: A guide assessing  
the current trends in office  
lighting and its future direction*

## WHAT FIXTURES WORK BEST IN OFFICE ENVIRONMENTS?

In a very simple approach to office lighting, it is possible to differentiate between fixed and flexible luminaires. Fixed types include recessed, semi-recessed, pendant and downlight, while flexible variants comprise free-standing, task and uplight.

Office lighting solutions should be personal, smart and high in quality. Personal means tailoring the light to individual needs, thus improving and enriching user experience. This level of customization should be complemented by intelligence. Sensors, the cloud, data analytics and algorithms are known to drive useful new products and services, while an intuitive user interface helps to control the increasingly complex functions of light fittings.



### Style guide to different workspaces

It is worth restating that office workspaces are not homogeneous, which is why there exists a wide portfolio of luminaires to help designers create the perfect look and meet the needs of all stakeholders, be it for new-build or renovation projects.

Take a multi-function office which serves as a training, flexible working and meeting room. Such a space might easily benefit from large, circular ceiling-mounted light fixtures that provide direct and indirect glare-free light. This solution will likely differ from that applied to an open-plan office featuring a variety of dedicated activity zones. Here, an endless linear fixture could be fully integrated with both ceiling and architecture, or used in semi-recessed or suspended (pendant) format. The use of an endless diffuser (supplied on a roll) will ensure no joins are visible.

Free-standing flexible luminaires also benefit most office landscapes. The latest light fixtures of this type are available in tunable white versions controlled by an intuitive graphical app to adjust luminance and color temperature. Users can also choose dynamic light scenarios, such as following the daylight trend, or even more personalized concepts. These free-standing luminaires can be connected via the cloud, using a dashboard to visualize data. Sensors capture information about luminance, user presence, temperature and more.

An office bureau with both informal and formal areas presents another common application. Stream-tunable uplights might well provide a good solution here, projecting very large light circles on to the ceiling. This impression evokes the feeling of sunlight in the office, creating a very open atmosphere with good homogeneity of desk area. A cooler color temperature could be adopted for the formal space, with a warmer color temperature for the informal zone.

And there should be no overlooking work areas illuminated by task luminaires. With the latest models sporting optics that create an asymmetric glare-free beam, users can leverage fully tunable capabilities to create their personal micro-atmosphere.





*A flexible approach to lighting design is very important, particularly having luminaires that adapt easily with office layout redesigns.*

*Furthermore, versatile environments have to be equipped with very high quality lighting. We must step towards the possibilities that exist now with spectrum and lighting distribution, and do it in a much better way than previously.*

**Kornelius Reutter**  
Product Manager,  
Design & Innovation,  
Regent Lighting



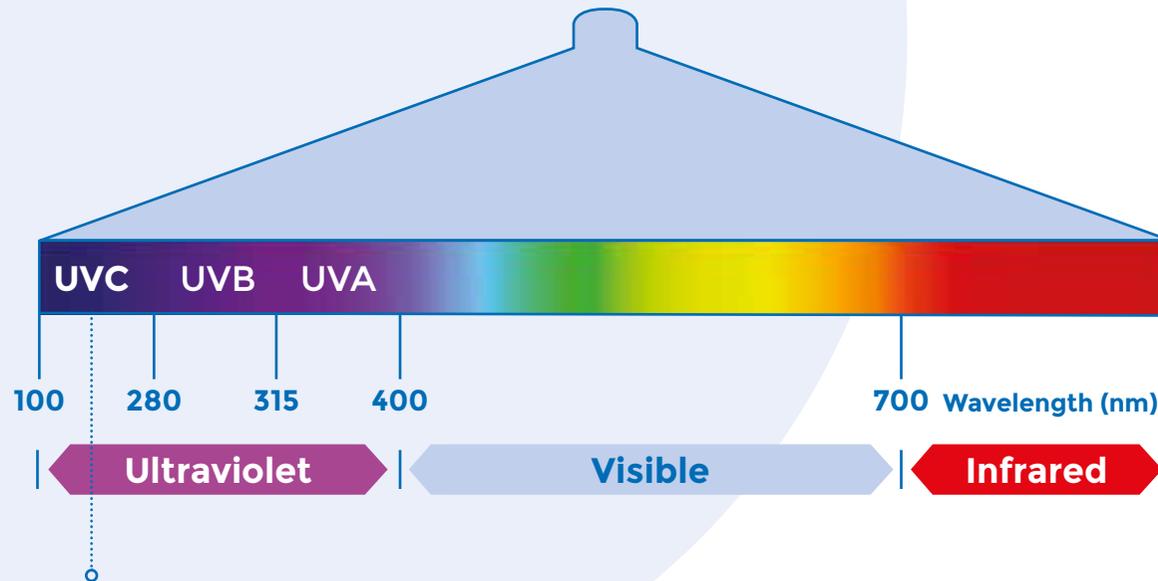
***The future of office lighting in the workplace.***

*NICHIA: A guide assessing the current trends in office lighting and its future direction*

## THE UV-C OPPORTUNITY:

In the future there will be a desire to create office spaces that are safe, where people can collaborate with minimum health risk. UV-C disinfection technology has been proven to inactivate - without exception - all bacteria and viruses it has been tested against, and is therefore a key element in the integral design of safe spaces.

Unfortunately, it is not easy to integrate UV-C technology into existing office lighting concepts. UV rays are different to light, while there are some obvious safety concerns regarding the exposure of office workers to UV. Disinfection processes could only realistically take place in an empty office. In addition, UV will only kill bacteria and viruses in direct line of sight, so the development of a moveable system may be necessary. Ultimately, the adoption of UV-C will likely become a more specialized luminaire solution that could well become popular, but only following careful investigation.



**UV-C light disinfects air, surfaces and water**

UV-C LEDs from NICHIA already exist. The company is working with LED module and optics partners to permit successful integration with light fixtures. Nevertheless, the thinking remains that UV-C is a companion technology, and that high touch surfaces are best cleaned with disinfectant spray while ensuring adequate ventilation.

## A PEEK INTO THE FUTURE OF OFFICE LIGHTING

**NICHIA has just recently announced a new and improved Circadian Tunable LED offering. This new tunable LED pairing has been developed to enhance the regulation of your Body Clock by combining both the stimulation and calming doses, in addition to color tuning.**

This Circadian Tune technology harnesses NICHIA's expertise in developing a unique Phosphor Converted Cyan, among other semiconductor processes and packaging techniques. The supplementary component is the inclusion of NICHIA's newly launched LEDs with TriGain® technology, a potassium fluorosilicate (PFS) based phosphor technology licensed to NICHIA through a strategic partnership with GE Current.

Most existing human-centric lighting systems mainly work by changing CCT (correlated color temperature). Some have started using individual “energizing” or “calming” LEDs, including NICHIA's Vitasolis™. However, NICHIA's new Circadian Tune LED products will raise the bar to also address efficacy, color quality and increased Melanopsin Stimulation, the light that explicitly targets melanopsin-containing neurons in the retina of the eye. These neurons, called Intrinsically Photosensitive Retinal Ganglion Cells (ipRGCs), are connected to a region of the brain responsible for regulation of the 24-hour circadian cycle along with associated reflexive neuronal and hormonal responses to the presence of light.

Sensitive to a particular range of wavelengths, melanopsin photoreceptors reach peak light absorption at wavelengths around 490nm. By utilizing NICHIA's Phosphor Converted InGaN Cyan, NICHIA's Circadian Tune LEDs are optimized at the most sensitive wavelength of ipRGCs. Indeed, this approach provides a higher performance through its unique combination of lumens per watt (lpW), TM30 and Melanopic Ratio (MR) than other human-centric lighting solutions.

Using NICHIA's new Circadian Tune technology, the high MR and cooler CCT will reduce fatigue and provide greater alertness to help office workers remain in an awakened state of mind or help night workers complete their shifts effectively. At a low MR and warm CCT, the focus switches to relaxation, prompting a feeling of safety and initializing a transition to sleep. A sense of time is therefore introduced when both proper melanopsin stimulus and variable CCT is being applied.



NICHIA's Phosphor Converted Cyan outperforms a pure InGaN die based cyan in many ways. As highlighted by Phosphor Engineer Sadakazu Wakui at an industry summit, the Phosphor Converted Cyan delivers a higher lumens per watt (lpW) performance versus a traditional pure InGaN cyan. Additionally, the PC Cyan provides the same forward voltage (VF) as standard white LEDs, as well as the same z-height for optical matching. Couple this unique PC Cyan and NICHIA's Warm White LEDs with TriGain® technology, the system can achieve a CRI of 90+, with high TM-30 values, while delivering a lpW performance equivalent to that of an 80 CRI LED. A balanced human circadian lighting system is achieved with simply no loss in efficacy.

Using NICHIA's new Circadian Tune technology, the high MR and cooler CCT will reduce fatigue and provide greater alertness to help office workers remain in an awakened state of mind or help night workers complete their shifts effectively. At a low MR and warm CCT, the focus switches to relaxation, prompting a feeling of safety and initializing a transition to sleep. A sense of time is therefore introduced when both proper melanopsin stimulus and variable CCT is being applied.

“New Circadian Tune LED products are truly innovative. Through an optimization of efficacy, color quality and Melanopsin Stimulation, we can better target ipRGCs. Additionally, the utilization of a traditional 80 CRI warm white for the relaxing portion limits the color quality of the system. To overcome these limitations, NICHIA has introduced this Phosphor Converted Cyan and Warm White TriGain® pairing,” explains Satoshi Okada, General Lighting Business Planning Manager of NICHIA Japan.

“NICHIA introduced Vitasolis™ in 2019, a range of LEDs geared to suppress fatigue and boost vitality. The Circadian Tune LED pairing builds on these innovations to offer a more dynamic and tunable solution to the global lighting industry.”

LEDs with TriGain® technology are available now in NICHIA's 757 series, the industry's first and leading mid-power LED. The new unique Phosphor Converted Cyan will be available within the first half of 2021.

Vitasolis™

Optisolis™

2-in-1 Tunable LED



The future of office lighting depends on many factors, not least the development of new LED technologies. NICHIA has proven over many decades that it leads the way in advanced LED solutions that set the industry tone moving forward.

To learn more, contact NICHIA today [info\\_de@nichia.eu](mailto:info_de@nichia.eu)

View our webinar:



Nichia Chemical Europe GmbH  
Westerbachstr. 28  
61476 Kronberg i. Ts.  
Germany