ISSN 1993-890X
www.led-professional.com

LED professional

BY LUGER RESEARCH

Review

LpR 109

May/June 2025

LIGHTING INTERVIEW WITH HEINRICH THYE

LIGHTING DESIGN WITH DRONES AND AMBIENT COMMUNICATION

DALI LIGHTING AWARDS WINNERS

The Global Information Hub for Lighting Technologies and Design

Your Portable Lighting Powerhouse

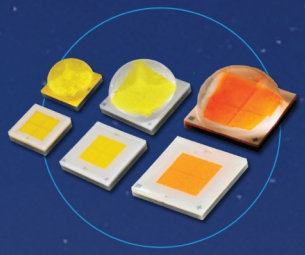
Cree LED delivers unmatched throw, beam quality & performance

For over 10 years, our innovations have powered the industry's most advanced flashlights, torches, headlamps and bike lights. From barrier-breaking beam distance to incredible lumen density, Cree LED delivers the performance your customers demand.

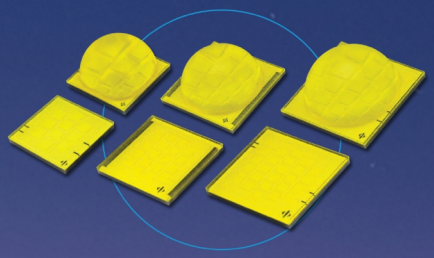
- New! XLamp® XP-GR & XP-LR LEDs – Round LES and optics deliver ultra-sharp beams and long throw in the familiar XP footprint
- 3V XLamp XHP Extreme High Power LEDs – High density and high intensity options with massive lumen output
- XLamp XFL Flashlight LEDs – Purpose-built for flashlights with breakthrough throw distance and compact design
- XLamp XP-G4 High Intensity LEDs – Up to 1,017 lumens, large thermal pad for efficiency, optimized for pinpoint beams
- Exclusive overdrive guidance and reference designs available

XLamp XP-GR & XP-LR LEDs

XLamp XP-G4 LEDs



XLamp XHP LEDs



XLamp XFL LEDs

Get details: cree-led.com/portable

Always Innovating. Always Leading.

Follow us at:

International Commission on Illumination
Commission Internationale de l'Eclairage
Internationale Beleuchtungskommission

JOIN US FOR CIE 2025 MIDTERM MEETING

VIENNA, AUSTRIA

July 4-11, 2025

The **International Commission on Illumination (CIE)** invites you to the **CIE 2025 Midterm Meeting**, taking place from **July 4-11, 2025**. The meeting features the biennial **CIE Scientific Conference**, which will be followed by the **CIE Divisions and Technical Committee (TC) meetings** where CIE's ongoing work will be discussed.

Key Events

- **CIE Scientific Conference** | July 7–9, 2025
- **Welcome Reception at Vienna City Hall** | July 6, 2025
- **CIE Divisions & TC Meetings** | July 10–11, 2025

Registraion Now Open: Secure your spot at the CIE 2025 Scientific Conference.
Early bird registration available until May 1, 2025.

CIE2025 WEBSITE

Key Highlights

- **Keynote Lectures** featuring topics on AI in the colour industry, light pollution, and light & human health
- **Workshops** exploring topics such as indoor lighting, colour management, HDR imaging, road lighting, light & insects, and lighting education
- **Two Days of Poster Sessions** presenting innovative research and new ideas
- **Three Parallel Sessions** showcasing research across all six CIE Divisions
- **Networking Events** for students and early-career professionals with CIE Leadership
- **On-Site Exhibitions** highlighting the latest in lighting science and technology
- **Social Events:** Sightseeing tour, CIE Badminton Tournament, Gala Dinner

We look forward to welcoming you to Vienna for what promises to be an inspiring and insightful event!

Event Supporters

TRILUX SIMPLIFY YOUR LIGHT. — CIE 2025 Gold Sponsor

EVERFINE — CIE 2025 Silver Sponsor

Gigahertz-Optik Member of the BERGHOF GROUP — CIE 2025 Silver Sponsor

Heliobus The daylight company — CIE 2025 Silver Sponsor

TechnoTeam Bildverarbeitung GmbH — CIE 2025 Bronze Sponsor

QRAD — CIE 2025 Bronze Sponsor

City of Vienna

MEETING DESTINATION VIENNA

The New Lighting Era Begins

Once again, it is time to present the latest issue of LED professional Review (LpR).

Jan Denneman opens this edition with his commentary on quality lighting, with a particular focus on the latest scientific findings relevant to lighting design. We're also honored to feature an exclusive interview with Heinrich Thye, Secretary General of the Zhaga Consortium, who shares insights on current developments and the future of Zhaga standardization. LightingEurope provides a report on the recent European Lighting Summit 2025, emphasizing the growing importance of policy in shaping the future of the lighting industry. Our sincere thanks go to Secretary General Elena Scaroni for her contribution.

Zumtobel celebrates its 75th anniversary, and on this occasion, one of the most iconic and innovative lighting systems in their portfolio has been reimagined and relaunched in collaboration with Pininfarina. Read all about the background and key details surrounding the launch of the TECTON II luminaire generation.

This year, I had the honor of serving on the jury of the DALI Lighting Awards, and I can attest to how thorough, detailed, and evidence-based the evaluation process was. You'll find a comprehensive report on the DALI Awards 2025 in this issue.

Thought leader Dr. David Emerson contributes a compelling commentary on the coming LED revolution, exploring how the industry is on the verge of a transformative shift.

We also cover two fascinating topics in lighting design: Dr. Perez presents an innovative lighting assessment using drones, while Tapio Rosenius introduces the concept of Ambient Communication. Sustainability is another key focus in this edition. Jaap Nuesink explores the topic of repairability in depth, offering valuable insights into this increasingly important issue.

We hope you'll find a lot of inspiration and valuable information in this issue. Enjoy your read!

Yours Sincerely,

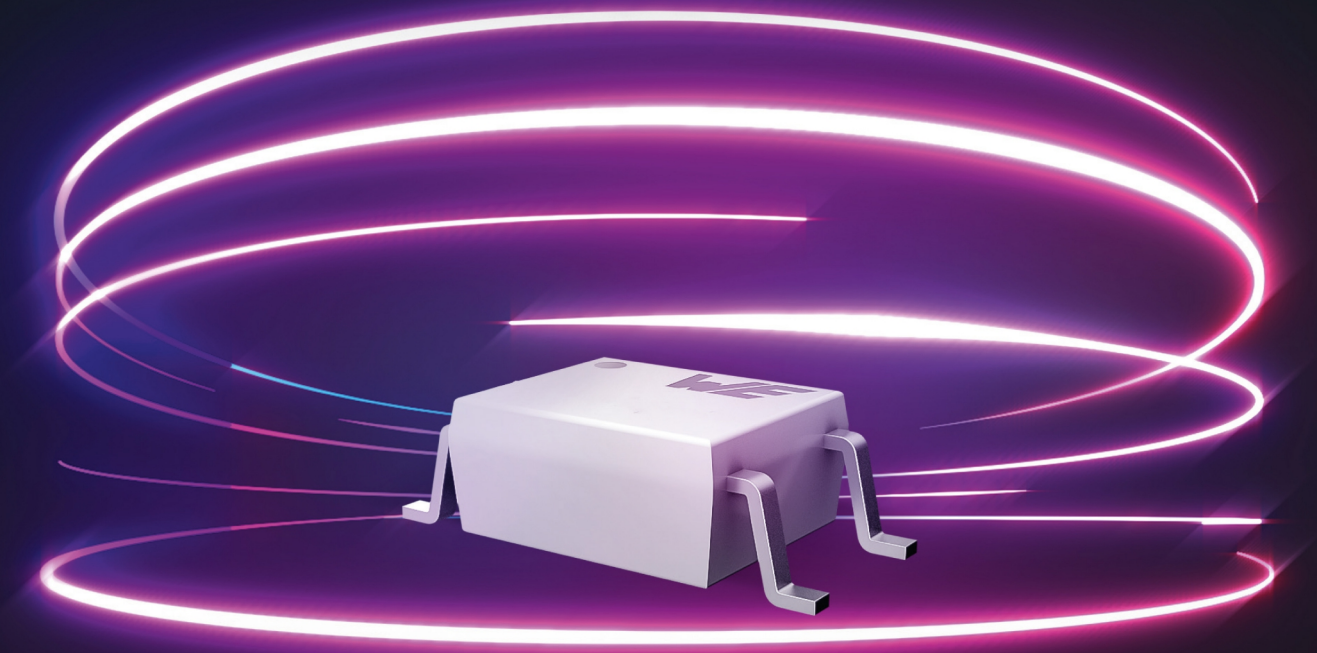
Siegfried Luger

Founder & CEO of Luger Research e.U.
Publisher of LED professional, Trends in Lighting, LpS Digital, and the Global Lighting Directory

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

PERFORMANCE.
RELIABILITY.
SERVICE.

Optocouplers by Würth Elektronik



© elPal

WE are here for you!

Join our free webinars on:
www.we-online.com/webinars

Optocouplers by Würth Elektronik
With the new optocouplers, Würth Elektronik presents one of the latest additions to its optoelectronic product portfolio. The innovative design features a coplanar structure and high-grade silicon for total internal reflection. The coplanar design ensures the isolation gap stay fixed during the production process and provide perfect isolation and protection for your application. The total internal reflection provide stable CTR over the whole temperature range and high CTR even at low current operation.

Provided in all industry standard packages. Available with all binnings ex stock.
Samples free of charge: **www.we-online.com/optocoupler**

Highlights
- Innovative coplanar design
- High grade silicon encapsulation
- Copper leadframe for high reliability
- Stable CTR over whole temperature range
- High CTR in low current operation

DIP-4 SOP-4 LSOP-4

#OptocouplersbyWE

AWARDS

THOUGHT LEADERS

LIGHTING DESIGN

SUSTAINABLILITY

LPS DIGITAL TALKS

ADVERTISING INDEX

Jan Denneman, Good Light Group

Jan Denneman is the founder and chairman of the Good Light Group and an ambassador of the Global Lighting Association.

The Good Light Group is a non-profit organization dedicated to promoting good indoor lighting — either natural daylight or electric light that provides similar positive effects on health and well-being. Good light helps synchronize the biological clock, improves sleep quality, increases daytime energy levels, and supports a better mood and long-term health.

With more than 45 years of experience in lighting, Jan has developed deep expertise in the impact of light on human beings. He served as Vice President at Philips Lighting (now Signify), where he held leadership roles in innovation, product development, marketing, and sustainability.

Jan is the (co-)founder of several leading international lighting consortia, including: the Global Lighting Association (Chairman 2007–2017), Zhaga, The Connected Lighting Alliance, LightingEurope (Chairman 2013–2017) and Good Light Group (Chairman since 2019).

Jan shares his expertise on healthy lighting and sleep across multiple social media platforms—including Instagram, TikTok, YouTube, and Facebook—under the name @JanSleepman. On LinkedIn, he is active under his own name.

Integrative Lighting – A Call to Action for the Lighting Design Community

The recent publication of the IALD white paper ***"Lighting Design for Health, Wellbeing and Quality of Light – A Holistic Approach to Integrative Lighting"*** marks an important milestone in our shared mission to improve lives through better indoor lighting. As president of the Good Light Group, I am proud that our foundation has stimulated and supported this important work. Our partnership with the IALD is built on a shared vision: light is not only about aesthetics or energy efficiency, but about people – their health, sleep, mood, and daily functioning.

This white paper comes at a crucial time. Most people today spend over 90% of their time indoors, shielded from the natural light we evolved under. As a result, their biological rhythms are disrupted, sleep suffers, and long-term health is at risk. Yet many building projects – even award-winning ones – still ignore the fundamental fact that daylight is a biological need. This white paper, expertly led by Kevan Shaw and the IALD European Regulatory Affairs Working Group, confronts that reality and gives lighting designers the tools and insights to respond. Kevan's leadership has been instrumental in shaping a document that is both scientifically grounded and highly relevant to daily design practice.

For lighting professionals, this is a call to action. When we design indoor lighting, we must recognize that we are not just filling a space with light – we are compensating for a missing natural resource. That carries responsibility. The paper introduces a health-supportive approach to lighting, addressing not only visual comfort but also the impact of light on sleep, mood, and the body's internal clock. It outlines evidence-based metrics like melanopic equivalent daylight illuminance (MEDI) and recommends practical daytime and evening light levels. It emphasizes the importance of aligning artificial lighting with the body's natural rhythms.

Importantly, the paper is written for lighting designers, by lighting designers and researchers who understand the challenges of real-world projects.

It is not a medical treatise, but a design document grounded in science and aimed at practice. Topics such as circadian entrainment, the role of infrared and near-infrared, flicker, photobiological safety, and light quality are clearly explained. This is knowledge every lighting designer needs today – and will need even more tomorrow.

The white paper's publication also reflects the growing recognition of biologically effective lighting in building standards like WELL and DIN/TS 67600. It is no longer enough to meet minimum visual or energy codes. Truly good lighting also supports alertness during the day, healthy sleep at night, and long-term wellbeing. The Good Light Group will continue to advocate for this perspective. We believe that "good light" is a human right – one that should be available to all, whether indoors or out. We are proud to collaborate with the IALD and other leading partners who share this belief and are helping to make it a reality. This white paper is an excellent step forward, and I invite everyone in our profession to read it carefully, share it widely, and apply its insights in their own work. Together, we can move from awareness to action – from just illuminating spaces to truly supporting life within them. ■

J.D.

You may download the IALD white paper for free below:

"Lighting Design for Health, Wellbeing and Quality of Light – A Holistic Approach to Integrative Lighting"

https://iald.org/IALD/IALD/Store

Good light
for a healthier and happier life

Discover how good light indoors can improve sleep, energy and physical and mental well-being.

www.goodlightgroup.org

Photo by Copernico P on Unsplash

Good Light Group

The Good Light Group is an international non-profit organisation promoting the use of biologically effective light, indoors and outdoors, for better sleep, mood and overall health. We collaborate with leading researchers, architects, lighting designers, engineers and lighting companies to bring evidence-based daylight solutions into everyday environments.

Learn more or become a participant: **info@GoodLightGroup.org**

LightingEurope Confirms Executive Board and President

www.lightingeurope.org

On March 28th, the LightingEurope General Assembly re-elected the outgoing Executive Board for a two-year mandate. The role of the LightingEurope Executive Board is to implement LightingEurope's strategy and work program. It is composed of 16 members, equally divided between representatives of member national lighting associations and member companies.

The newly appointed Board confirmed Maurice Maes as President of LightingEurope on the same day. Maurice Maes has been Head of Standards & Regulations at Signify since 2015 and has more than 25 years of experience in associations, having served on the boards of industry initiatives such as the ZigBee Alliance, LightingEurope and as President of the Global Lighting Association.

Jürgen Waldorf, Managing Director of the ZVEI Lighting Division and licht.de, was also reelected as Vice President, and Miguel Aguado, Marketing and Technology Manager EMEA at Lutron, was re-elected as Treasurer.

"I am honored to be re-elected as President of LightingEurope and would like to thank the Board and our members for their trust. Our industry is at a pivotal moment, with opportunities to better enforce existing regulations and shape the ones to come. Together with the members of the Board and the Secretariat of LightingEurope, our mission is to lead the European lighting industry towards the LightingEurope 2030 vision, promoting a European market where the value of lighting is widely recognized, supported by robust regulations that encourage innovation in sustainable, digital lighting," says Maurice Maes.

The Executive Board consists of the following members (by alphabetical order of family name):

- Miguel Aguado, Lutron, UK (Treasurer)
- Alfredo Berges, Anfalum, Spain
- Flavio Bertoli, Ledvance, Germany
- Jean-Marie Croué, Syndicat du Luminaire-GIL, France
- Alfonso D'Andretta, Gewiss, Italy
- Ayça Donaghy, The LIA, UK
- Emmanuel Gagnez, Syndicat de l'Éclairage, France
- Fahir Gök, AGID, Türkiye
- Maurice Maes, Signify, The Netherlands (President)
- Jörg Minnerup, Trilux, Germany
- Isacco Neri, Assil, Italy
- Arnulf Rupp, Inventronics, Germany
- Mark Oliver Schreiter, Erco, Germany
- Carlo Urbinati, Assoluce, Italy
- vKlaus Vamberszky, Zumtobel Group, Austria
- Dr. Jürgen Waldorf, ZVEI, Germany (Vice-President)

Contact: Elena Scaroni, Secretary General, mailto:elena.scaroni@lightingeurope.org

About LightingEurope
LightingEurope is the voice of the lighting industry, based in Brussels and representing 32 companies and national associations. Together these members account for over 1,000 European companies, a majority of which are small or medium-sized. They represent a total European workforce of over 80,000 people and an annual turnover exceeding 15 billion euro. LightingEurope is committed to promoting efficient lighting that benefits human comfort, safety and well-being, and the environment. LightingEurope advocates a positive business and regulatory environment to foster fair competition and growth for the European lighting industry. ■

ams OSRAM has Published the Annual Report 2024

ams-osram.com

Download the Annual Report 2024:
https://ams-osram.com/documents/d/ams-osram/annualreport2024

The ams OSRAM Group (SIX: AMS) is a global leader in innovative light and sensor solutions.

With more than 110 years of industry experience, they combine engineering excellence and global manufacturing with a passion for cutting-edge innovation. Their commitment to pushing the boundaries of illumination, visualization, and sensing enable transformative advancements in the automotive, industrial, medical, and consumer industries.

"Sense the power of light" – ams OSRAM's success is based on the deep understanding of the potential of light and their distinct portfolio of both emitter and sensor technologies. Approximately 19,700 employees worldwide focus on pioneering innovations alongside the societal megatrends of digitalization, smart living and sustainability. This is reflected in over 13,000 patents granted and applied.

Headquartered in Premstaetten/Graz (Austria) with co-headquarters in Munich (Germany), the group achieved EUR 3.4 billion revenues in 2024 and is listed as ams-OSRAM AG on the SIX Swiss Exchange (ISIN: AT0000A3EPA4).

Zumtobel is a partner of Fundació Mies van der Rohe

www.zumtobel.com

As a new partner of Fundació Mies van der Rohe, Zumtobel is committed to promoting creative thought processes in contemporary architecture and supporting the renowned EUmies Awards architecture prize. The Spanish foundation takes its namesake from Ludwig Mies van der Rohe, one of modernism's most important architects, globally esteemed for pioneering the Bauhaus style. His motto "Less is more" shaped an architectural philosophy characterized by clear lines, open room concepts and innovative materiality. The upcoming highlight in the Fundació event calendar is the presentation of the prestigious Young Talents Award, which will take place at the Biennale Architettura in Venice on the 19th of June, 2025.

Founded in Barcelona in 1983, Fundació Mies van der Rohe dedicates itself to transferring the legacy of visionary architects into the built reality of the 21st century. A significant achievement in this dedication was the reconstruction of the Barcelona Pavilion, designed by Mies van der Rohe and Lilly Reich for the 1929 World's Fair. Today, the foundation offers a platform for the dialog surrounding contemporary architecture and

urban planning. The EUmies awards ceremony bestows accolades in three categories: Architecture, Emerging and Young Talent. Outstanding works of contemporary architecture are featured, making the EUmies recognized as the most prestigious architecture prize in Europe.

Regarding the partnership, Raphael Petri, VP Brand Zumtobel, has this to say: "We are very much looking forward to working with Fundació Mies van der Rohe. At Zumtobel, we strive to make the perfect interplay of light and architecture tangible. Our close cooperation with architects continuously inspires us and as part of our partnership, we would also like to support young talent and learn from them. Through project-specific lighting solutions, we are constantly developing our portfolio with the aim of improving people's quality of life through light. With Fundació Mies van der Rohe, we are establishing a meaningful collaboration."

As expressed by the foundation, Zumtobel actively supports the EUmies Awards as a collaborative partner, an initiative created in partnership with the European Commission. This June, the Young Talent Award will be presented in Venice. This acclaimed award endeavors to support the talents of recently graduated architects, urban planners and landscape architects, who will be responsible for transforming our environment in the future.

In the words of Anna Ramos, Director of the Fundació Mies van der Rohe: "Fundació Mies van der Rohe is very pleased that Zumtobel has joined the valued group of partners supporting the EUmies Awards, especially this year in which Young Talent is taking place. With Zumtobel's collaboration, we will strengthen our efforts to support the young generation of architects in establishing their careers. The company's guiding values—innovation, sustainability, and excellence in lighting systems, key elements in the quality of architecture—guarantee a shared vision, committed to improving the built environment for future generations." ■

Signify and Mercedes-AMG PETRONAS Formula One Team Launch Performance Desk Lamp

https://pages.information.signify.com

Signify, the world leader in lighting, and Mercedes-AMG PETRONAS Formula One Team launched a co-designed performance desk lamp. The desk lamp showcases a shared commitment to enhance performance and well-being through lighting innovation.

Conceived and created by optics engineers at Signify, the desk lamp incorporates cutting-edge technologies and specifications with a design inspired by Mercedes F1. The Signify Mercedes-AMG PETRONAS Formula One Desk Lamp provides precision illumination, with a range of color temperature options, supports eye comfort and aids alertness in any scenario it is used for – from drawing and studying, to watching movies and playing e-sports.

The dimmable lamp features EyeCare light desktop technology with curved micro prism light emitting surfaces on both sides, which spread the light source without glare, making it ideal for any workspace or setting. The lamp is equipped with a resting reminder function to promote eye care and rest, as well as a motion sensor that turns the lamp off when the user walks away.

With a sleek design inspired by Mercedes-AMG PETRONAS Formula One Team – incorporating carbon fiber accents, a sand brushed aluminum stem and the team's iconic color scheme – the lamp flawlessly spotlights the efforts of two world leaders in their respective fields. The high-performance materials not only reflect the race car design but also embody its exceptional wear resistance, resulting in a durable product.

The desk lamp will be on sale in China in the following weeks.

Richard Sanders, Chief Commercial Officer, Mercedes-AMG PETRONAS F1 team, said: "Our partnership with Signify goes beyond logos on a car; it's about our shared commitment to bringing to life meaningful and responsible innovations. As our first collaborative product, this lamp stands as a testament to our joint passion for pushing the boundaries of what's possible. We're proud of our creation and look forward to fans being able to experience cutting-edge design and technology in their own homes."

Olivia Qiu, Chief Innovation Officer, CEO Greater China Business and interim, Chairwoman of the Board of KLITE added: "At Signify, we are dedicated to unlocking the extraordinary potential of light to improve performance, well-being and our everyday

surroundings. From lighting some of the world's most iconic night races, to supporting the Mercedes-AMG PETRONAS Formula One team at its HQ and as the team travels the globe, our products allow people to see, feel and perform at their best in the most demanding of circumstances. This desk lamp is the product of a deep collaboration, and we're thrilled for customers to be able to purchase it in China, in the coming weeks."

In a sport where success is driven by marginal gains in performance, Mercedes-AMG PETRONAS F1 Team and Signify, as its official lighting partner, are collaborating on lighting installations to deliver optimal conditions for athletes and team members to see, feel, and function at their best. Signify lighting innovations have been installed and integrated across multiple locations and facilities across the team's estate and as they travel the world.

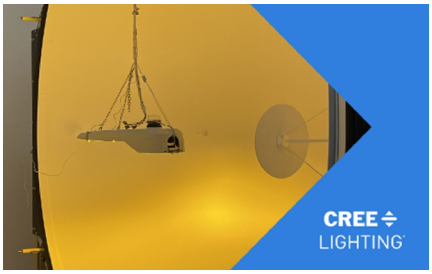
Signify's NatureConnect technology has helped the team's engineers focus during long simulator sessions at the team's UK headquarters by mimicking natural daylight cycles in windowless areas. On the road, portable travel lamps help regulate circadian rhythms, helping drivers and engineers adjust light levels, controlling their exposure to stimulating blue light. Finally, as part of the scientifically designed jet lag plan, developed with the team doctor, light exposure is managed precisely to aid sleep, speed up recovery, and optimize cognitive function.

The Signify Mercedes-AMG PETRONAS Formula One Desk Lamp will be available for purchase in China in the following weeks via: https://philipszm.tmall.com/ (Priced at CNY 2,299). ■

Lighting That Respects Life at Night: Cree Lighting and Lumileds Collaborate on 1900K/50CRI Low-Blue Outdoor Lighting Solution

www.creelighting.com

Cree Lighting, a leader in innovative LED lighting solutions, is pleased to announce an expansion in its available correlated color temperature options to include a new 1900K/50CRI (19K5) offering across a broad range of its popular outdoor lighting solutions. The 19K5 option was specifically developed to significantly reduce blue light emissions of outdoor lighting applications while still maintaining illumination and energy performance goals.



With a correlated color temperature (CCT) of 1900K and color rendering index (CRI) of 50, the 19K5 option emits a warm, amber-white light with less than 2% blue content between 400nm and 500nm. Powered by Lumileds' LUXEON 3030 LEDs with NightScape Technology™, 19K5 delivers a new, purpose-built option for municipalities and blue-light-sensitive regions where reducing light pollution, and its impact on people, wildlife, and the night sky, is a priority.

Meeting Modern Outdoor Lighting Needs

As support for wildlife and dark-sky preservation grows, a new trend has appeared with the emergence of lighting ordinances that set strict limits on blue light emissions. Lumileds' NightScape Technology was developed with these use cases in mind—providing a thoughtfully engineered solution that balances ecological awareness with practical lighting needs. It stands apart from typical amber or narrow-spectrum alternatives by maintaining LED efficiency alongside comparably superior CRI even at ultra-low CCT levels.

Cree Lighting is also rising to meet these new standards with solutions such as Guideway Series street lightsand OSQ Series area lights, which now feature this 19K5 LED option in combination with NanoComfort® Technology, a no-compromise optical design solution that delivers precise illumination, superior visual comfort, and elevated efficiency up to 171 LPW. These parallel advancements enable an unmatched combination of color, comfort and control to support communities with their environmentally conscious lighting goals.

Key Features of the 1900K/50CRI LED Lighting Solution:

- Low Blue Light Emissions: Less than 2% between 400–500nm, supporting wildlife protection and dark-sky preservation
- 1900K Warm Light: Casts a soft, flame-like white glow designed for nighttime environments with minimal glare or disruption.
- Targeted CRI of 50: Broad spectrum light delivers visually comfortable outdoor color rendering appropriately balancing color accuracy and critical environmental impact.
- Energy-Efficient LED Performance: Provides high luminous efficacy while delivering a specialized spectrum output.
- Environmentally Conscious Option: Meets specifications for low-impact outdoor lighting, minimizing impact on wildlife, such as migrating birds and their habitat.
- Reliability in the Field: Built to endure harsh outdoor environments, offering long-term, low-maintenance performance.
  Purpose-Built Lighting for a Responsible Future

This new 1900K/50CRI choice expands Cree Lighting's outdoor portfolio, offering a solution for those seeking to minimize the ecological footprint of their nighttime illumination. Whether in coastal regions, wildlife corridors, or designated dark-sky zones, this low-blue solution allows communities to provide safe and responsible lighting.

"19K5 provides a thoughtful, intentional choice for communities proactively seeking to reduce blue light emissions," said Kurt Wilcox, Vice President of Research and Development, at Cree Lighting. "When combined with our popular NanoComfort Technology optical platform, this expanded offering demonstrates our commitment to lead the industry in delivering high value application-optimized solutions to our customers."

Steve Barlow, CEO of Lumileds, added, "NightScape Technology is crafted for applications where the goal is to minimize environmental harm while delivering efficiency and a flame-like warm glow not possible with amber sources. We are proud to provide Cree Lighting with LEDs that help communities achieve their lighting goals."

Now Available Across a Range of Cree Lighting Products

The 1900K/50CRI option, incorporating Lumileds' NightScape Technology, is now available as a standard offering across a variety of Cree Lighting products, including street, area, flood, canopy, wall mount, and bollard luminaires.

To learn more about Cree Lighting's 19K5 product offerings and explore project support or purchasing options, visit www.creelighting.com/19K5.

For more details on Lumileds NightScape Technology, visit www.lumileds.com.

About Cree Lighting
Cree Lighting is a USA-based innovator and manufacturer of high-performance LED lighting for petroleum, roadway, and commercial applications. With over four decades of experience and millions of fixtures installed across North America and beyond, Cree Lighting delivers trusted quality and solutions that help communities thrive—day and night. Visit CreeLighting.com for more information.

About Lumileds
Lumileds is a global leader in LED and microLED innovation, delivering advanced solutions for lighting, mobility, displays, and more. With operations in over 15 countries, Lumileds provides OEMs and manufacturers with technology that improves performance while reducing environmental impact. Visit Lumileds.com for more information. ■

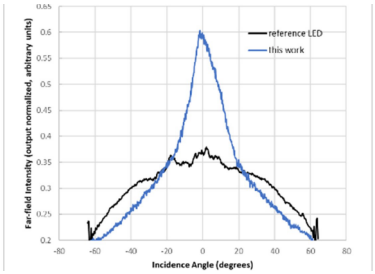
Breakthrough MicroLED Development Delivers Improved Emission Directionality and Efficiency

www.lumileds.com

A collaboration between Lumileds and Eindhoven University of Technology has produced a technology breakthrough that employs metasurfaces integrated at the chip level to significantly improve MicroLED emission directionality and enhance MicroLED efficiency.

This technology holds promise for a wide range of LED applications. This breakthrough offers the potential for much greater MicroLED display luminance and significantly more effective optical coupling for applications such as augmented reality or data communication applications This pioneering work is published in the April 6 issue of Nature Communications Engineering.

The Breakthrough Researchers embedded a metasurface consisting of nano-sized disks within the p-contact layer of MicroLEDs and stimulated collective resonances with emitting dipoles in the active region. The enhanced light outcoupling and radiative recombination led to notable improvements in LED efficiency. Additionally, the design of the nanostructure lattice was tailored to manipulate the far-field emission pattern of the LED. The team successfully showed that on-axis candela can be doubled for comparable LED output.



"For various applications such as augmented reality and data communication, the typical Lambertian radiation pattern of LEDs is too broad to efficiently couple with secondary optics. It also limits luminance in high ambient light conditions for direct-view displays," explained Toni Lopez, Distinguished Scientist at Lumileds R&D. "To overcome these limitations, we turned to nanophotonics.

"The practicality of this approach lies in integrating metasurfaces into common composite contact technology, which eliminates damage to the semiconductor while leveraging existing manufacturing technologies," noted Oleg Shchekin, CTO of Lumileds. "Beyond MicroLEDs, this technology holds promise for a wide range of LED applications. The achievement of enhanced light extraction and radiative rate is a prelude to future LED products with higher efficiency than what is possible with the current state-of-the-art composite contact technologies."

Lumileds is part of a multi-year partnership with Professor Jaime Gomez Rivas' team at TU Eindhoven. This breakthrough demonstrates how narrowing the emission angle of LEDs can be achieved while also boosting efficiency and is just one of the beneficial results of this collaboration.

About Lumileds
Lumileds is a global leader in LED and microLED technology, innovation, and solutions for the automotive, display, illumination, mobile, and other markets where light sources are essential. Our approximately 3,500 employees operate in over 15 countries and partner with our customers to deliver never before possible solutions for lighting, safety, and well-being. ■

New Combo Sensor Controller from Synapse

www.synapsewireless.com

Synapse Wireless, a leading provider of innovative wireless lighting solutions, has introduced the Combo Sensor Controller (CSEN1-H), a new lighting control device designed to meet the diverse needs of both indoor and outdoor lighting environments. The all-in-one device integrates advanced sensors and wireless capabilities into a compact, durable design, providing a streamlined solution for lighting control in complex and challenging settings.

Synapse Wireless, a leading provider of innovative wireless lighting solutions, has announced the launch of the Combo Sensor Controller (CSEN1), an all-in-one device designed for both outdoor and indoor lighting applications. Compact and durable, the CSEN1 integrates wireless communication, motion and light sensors, and advanced fixture control into a single streamlined package.

Designed to support a wide range of environments—including site and area lighting, parking garages, and industrial or warehouse facilities—the CSEN1 balances versatility with simplicity. It features a dual PIR motion sensor, a photocell for ambient light detection, and supports both 0-10V and D4i driver connectivity.

Installation is flexible and straightforward. The controller includes a Zhaga Book 18 base for standard mounting, along with an optional adapter for fixture knockout installations. A built-in SNAP antenna offers wireless communication range of up to 1,000 feet, enabling the CSEN1 to join SimplySnap mesh networks for scalable, site-wide lighting control.

"Our customers have been asking for us to release a combination lighting controller and motion sensor," said Rob Padgett, Sales Engineer at Synapse Wireless. "We're thrilled to deliver this all-in-one solution that simplifies installation and is versatile enough for both outdoor and indoor applications. It eliminates the need for separate components, offering a cost-effective, externally mounted package that works great for high bay, outdoor site & area, and parking garage lights."

Product Highlights

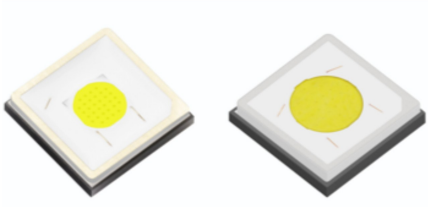
- Rugged & Versatile – Designed for both indoor and outdoor applications, making it ideal for site lighting, parking garages, and industrial spaces.
- All-in-One Smart Control – Combines a PIR motion sensor, photocell sensor, and wireless lighting controller in a single compact device.
- Flexible Driver Compatibility – Flexible Driver Compatibility – Supports 0-10V and D4i drivers with software-selectable configuration for simplified installation.
- Wireless Mesh Connectivity – Features a built-in SNAP antenna with a 1,000-foot range, ensuring seamless communication with SimplySnap devices.
- Flexible Mounting Options – Comes with a Zhaga Book-18 base and an optional fixture knockout adapter for quick and easy installation.
- Adaptive Lighting Control – Enables occupancy-based dimming, scheduling, and demand response for energy efficiency.
- SimplySnap Cloud Integration – Supports remote monitoring, multi-site management, and proactive alerts for system-wide visibility and control.
- Color Options – Available in white and grey to match different fixture designs and aesthetics.

About Synapse Wireless Inc.
Synapse Wireless Inc. is a leading provider of end-to-end wireless control systems, focusing on controlling and reducing energy consumption. Our team is dedicated to enhancing efficiency and control in various environments by providing lighting control and energy management solutions through SimplySnap. ■

Luminus Expands Round LED Technology with the SFT-12R and SFT-25R for Premium Outdoor Lighting

www.luminus.com

Luminus Devices, a pioneer in advanced lighting technology, announces the launch of its patented SFT-12R and SFT-25R Round LED Technologies, setting new benchmarks in optical performance for directional lighting applications.



The groundbreaking SFT series features a patented LED emitter with round light emitting surfaces (LES) in a flat top package, delivering unprecedented optical efficiency that requires up to 2.5 times less fixture flux compared to conventional LED solutions. This technological advancement translates to significant reductions in power consumption while maintaining superior illumination quality. "Our patented round LED emitter design represents a fundamental shift in LED technology," said Yves Bertic, Senior Business Line Director at Luminus. "The SFT-12R and SFT-25R are designed to be incredibly effective at directing light precisely where it's needed, dramatically reducing glare, and improving safety in outdoor environments."

Key Technological Breakthroughs:

- Innovative flat top package enables optimal proximity between optics and LED
- Advanced phosphor-on-chip technology ensures superior color uniformity across radiation angles
- Vertical chip architecture maximizes the Candela/Lumen K-Factor for enhanced precision
- Small LED emitter design with high current capabilities delivers exceptional lumen density
- Round LES distributes light more evenly, reducing hotspots and shadows resulting in a more uniform illumination
- The technology demonstrates particular excellence in demanding applications such as stadium lighting, street illumination, and stage/studio environments, where precise beam control and color consistency are crucial.

Target applications include:

- Stadium and sports lighting
- Street and roadway illumination
- Stage and studio lighting
- Off-road and portable lighting solutions
- Professional work lighting

For more information about the SFT-12R and SFT-25R and other cutting-edge lighting solutions, please visit www.luminus.com/products/white. This product line is now available through Luminus' authorized distributors.

Company Description: Luminus Devices develops and markets solid-state lighting solutions (SSL) to help its customers migrate from conventional lamp technologies to long-life and energy-efficient LED illumination. Combining technology originated from the Massachusetts Institute of Technology (MIT) with innovation from Silicon Valley, Luminus offers a comprehensive range of LED solutions for global lighting markets as well as high-output specialty lighting solutions for performance-driven markets including consumer displays, entertainment lighting and medical applications. Luminus is headquartered in Sunnyvale, California. ■

MetroSpec Technology® Advances Area Lighting into Powerful RGBW

flexrad.com

MetroSpec Technology, the leading American manufacturer of custom LED light sources, announces a major advance into full color area lighting – for street, path, and indoor lighting. High output FacetTILE™ modules provide a simplified base for building a multiplicity of fixtures, with minimum investment in wiring, heat sink structure, and labor. Patented FlexRad is at the core of millions of fixtures manufactured by MetroSpec's customers in North America.

FlexRad®

FacetTILE is designed for white, tunable white, and now RGBW implementation. Providing up to 1800 lumens per 2-inch module, FacetTILE can be supplied in linear forms, folded forms, or individual pucks. Linear sets of 12 can produce over 20,000 lumens.

Designed to accept off-the-shelf optics that can paint hundreds of different area distributions, FacetTILE is ideal for street, path, indoor walkway, wall wash, and dozens of other applications.

"FacetTILE is the newest of our many innovative FlexRad products that save design time and reduce production cost and inventory. FacetTILE is extremely modular and, using off-the-shelf lenses, covers a lot of ground for area lighting", said Todd Crandell, President and CEO of MetroSpec Technology.

Informational sheets and videos for FlexRad® technologies can be found on their website: flexrad.com. For more information on FacetTILE, please email: sales@flexrad.com.

About MetroSpec Technology
MetroSpec Technology is a LED light source manufacturing company specializing in custom flexible, high quality, high intensity lighting solutions tailored for light fixture manufacturers producing high end commercial, architectural, and hybrid lighting systems. MetroSpec offers quick development for all of their patented FlexRad LED light engines made exactly to custom specifications. FlexRad designs are innovative, field proven, and customizable to any shape and size with optional wires, connectors, or PMount™ press-in place fasteners.

MetroSpec Technology is located minutes from the Minneapolis-St. Paul International Airport in St. Paul, Minnesota. ■

EXC Ultra-High Efficiency Module Streetlights: Illuminating the Smart Roads of the Future

www.exclighting.com

In the context of global efforts to achieve carbon neutrality and peak carbon emissions, road lighting has emerged as a key sector for energy conservation and emissions reduction. Currently, China has over 32 million road lighting fixtures, accounting for approximately 30% of total lighting power consumption and about 3% of national electricity consumption. However, the national replacement rate of traditional road lighting with energy-saving LED streetlights remains between 40% and 60%, highlighting significant opportunities for improvement. As countries worldwide strive to meet stringent environmental and energy efficiency goals, the demand for advanced, sustainable lighting technology continues to grow.

In response to these challenges, EXC has positioned itself at the forefront of the sustainable and high-performance road lighting sector by introducing its cutting-edge ultra-high efficiency module streetlights. The company is committed to developing innovative lighting solutions that not only reduce energy consumption but also enhance the quality and longevity of road lighting infrastructure.

The EXC ultra-high efficiency module streetlight is a groundbreaking product designed to exceed the latest energy efficiency standards. Its core technology, the MYS4C/MLS6C module, achieves an impressive luminous efficiency of 250.5 LM/W, significantly surpassing the latest EU ErP energy efficiency rating of Class A. This remarkable performance results from advanced optical design, high-quality LED chips, and precision manufacturing processes, ensuring maximum light output with minimal energy consumption. The innovative design of the EXC module allows for consistent brightness and uniform light distribution, reducing dark spots and enhancing road safety. Moreover, the streetlights feature smart control capabilities, enabling adaptive brightness adjustments based on real-time traffic and weather conditions, further optimizing energy use and extending the product's lifespan.

EXC streetlights deliver significant economic and environmental advantages compared to traditional lighting solutions. For instance, a single 90W EXC module streetlight can effectively replace a traditional 400W high-pressure sodium lamp while maintaining or improving lighting quality. This results in annual energy savings of 1,200 kWh, equivalent to reducing electricity costs by approximately 115 USD per streetlight. From an environmental perspective, reduced energy consumption translates into an annual reduction of approximately 918 kg of CO□ emissions per streetlight — equivalent to planting 51 trees. By deploying EXC's energy-efficient streetlights on a large scale, municipalities and urban planners can contribute to global carbon reduction targets while lowering operational costs.

EXC's ultra-high efficiency module streetlights stand out due to their superior durability, cost-effectiveness, and energy-saving capabilities. The products are designed to

withstand harsh environmental conditions, ensuring long-term performance and minimal maintenance costs. The alignment of EXC's product strategy with global sustainability trends and government green development policies further enhances its market competitiveness. Independent testing and certification by authorities validate the quality and performance of EXC streetlights, providing assurance to customers seeking reliable and sustainable lighting solutions. EXC's comprehensive after-sales service and technical support also set the company apart, offering clients a seamless experience from installation to long-term maintenance.

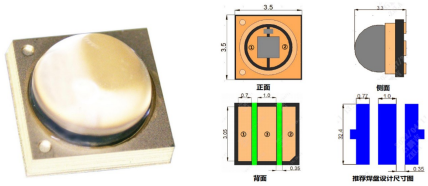
EXC's ultra-high efficiency streetlights have already been successfully implemented in multiple urban projects, delivering tangible benefits in energy savings and infrastructure enhancement. For example, the Shenyang Project (in China) involved replacing traditional 400Whigh-pressure sodium lamps with EXC's 150W EXC-RL-Z03 streetlights. This transition resulted in an impressive 66% reduction in energy consumption while improving lighting quality and road safety. These successful deployments demonstrate the scalability and effectiveness of EXC's lighting solutions, reinforcing the company's leadership in the road lighting sector.

EXC's ultra-high efficiency module streetlights represent a significant step forward in sustainable road lighting. Through cutting-edge technology, energy savings, and environmental benefits, EXC is paving the way for smarter, more sustainable urban infrastructure. Relevant overseas client groups are encouraged to explore EXC's product offerings at www.exclighting.com and consider integrating EXC streetlights into their road lighting projects. By choosing EXC, cities can reduce energy costs, enhance public safety, and contribute to a greener, more sustainable future. ■

Advanced UV Optoelectronics: Revolutionizing Large-Scale Water Disinfection with Deep Ultraviolet LED Technology

en.luan-uv.com

As the world grapples with escalating pressures on water resource management and public health security, traditional water treatment technologies are facing significant hurdles—including inefficiencies, high energy consumption, and risks of chemical residue. Data highlights the stakes: waterborne illnesses cost the global economy billions of dollars annually, underscoring the urgency for safer, more effective solutions. Conventional mercury-based UV lamps, long relied upon for disinfection, compound these issues with drawbacks like excessive energy use, short operational lifespans, and environmental hazards from mercury contamination—failings that increasingly clash with modern sustainability goals.



Against a backdrop of stricter environmental regulations and surging demand for clean water, Advanced UV Optoelectronics is emerging as a key innovator. The company's proprietary deep ultraviolet (UVC) LED technology offers a transformative answer, delivering a zero-pollution, high-efficiency approach to disinfection across industrial, municipal, and residential applications.

Innovative Technology: Breakthrough Application of Deep Ultraviolet LEDs

Advanced UV Optoelectronics has developed UVC LED components utilizing third-generation semiconductor material aluminum gallium nitride (AlGaN), delivering stable 275nm wavelength output that achieves a 99.99% pathogen inactivation rate. The company's flagship PF-C3FHB series stands out with a 150mW UV optical power rating and an operational lifespan exceeding 20,000 hours—key upgrades over traditional mercury-based systems, which are prone to fragility and require frequent maintenance. These advancements position the technology as a robust, low-maintenance solution for disinfection applications across medical, industrial, and consumer sectors.

Advanced UV Optoelectronics also offers the ZK-LDS17 series, a water sterilization system capable of handling 50 tons per hour. It employs 265-280nm UVC LED light to effectively disrupt microbial DNA/RNA, ensuring quick and permanent sterilization. The system features a fully sealed stainless-steel enclosure to prevent UV leakage and a modular design for adaptable configurations to suit diverse applications. It supports high-flow water treatment up to 100 tons per hour, making it perfect for continuous, large-scale disinfection, such as:

- Drinking water supply systems
- Industrial water aseptic treatment process
- Food and beverage processing facilities
- Swimming pool sterilization process
- Livestock farming water treatment

Integrated with smart optical systems and hydrodynamic optimization, real-time sensors and AI-driven algorithms dynamically adjust UV dosage to ensure consistent disinfection across varying water qualities, minimizing energy waste.

Economic and Environmental Synergy: Redefining Cost-Efficiency

In a municipal water supply project, replacing mercury lamps with Advanced UV Optoelectronics' water sterilization modules slashed daily energy consumption from 4,800 kWh to 1,800 kWh, yielding annual savings exceeding 500,000RMB. Modular design reduced maintenance costs by 70% and eliminated mercury contamination risks, delivering holistic value.

Environmentally, each system cuts annual CO□ emissions by 120 metrics—equivalent to planting 6,600 trees. If 30% of global mercury-based UV systems adopted Advanced UV Optoelectronics' solution, it would prevent tons of mercury discharge annually, drastically mitigating ecological and health hazards.

Core Strengths: Reliability and Comprehensive Support

Advanced UV Optoelectronics' UVC LED water sterilization system feature fully sealed, corrosion-resistant designs, operable in extreme temperatures from -40□ to 85□. Certified IP65 for waterproofing and backed by a 5-year warranty, they ensure long-term performance with minimal downtime. The company further provides customized disinfection solutions, remote operation support, and rapid-response services, covering the entire lifecycle from installation to maintenance.

Success Stories: From Industry to Public Infrastructure

At an industrial park in Shanxi, 20 water sterilization units reduced microbial contamination in cooling water systems from 0.8% to 0.02%, saving over 2 million RMB annually in chemical treatment costs. In a southern city's direct-drinking water project, the system treats 10,000 tons daily, achieving national potable standards and establishing the city as a "chemical-free disinfection" model.

Additionally, Advanced UV Optoelectronics' technology has been deployed in food processing plants and swimming pool facilities, where high-flow rate sterilization ensures compliance with stringent hygiene regulations while reducing operational costs by up to 40

Shaping the Future: Building a Sustainable Water Ecosystem

Advanced UV Optoelectronics continues to expand UVC LED applications in agricultural irrigation, medical wastewater, and pool

purification processes. Global water utilities, engineering firms, and governments are invited to collaborate to advance efficient, carbon-neutral water treatment solutions.

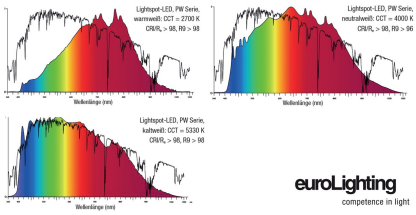
Choose Advanced UV Optoelectronics—ensuring every drop of water is safe and visible, safeguarding life's most vital resource with green innovation. ■

Back to Nature with Spectrum & Locus Adjustment (SLA)

www.eurolighting.de

SLA (Spectrum & Locus Adjustment) – The innovative Lightspot technology for precise definition of spectrum and color temperature.

Lightspot-LED, PW Serie



The light spectrum changes continuously from dawn to sunset. To ensure natural and healthy lighting with sun-like spectra, LEDs with different color temperatures are usually combined. However, if, for example, warm white light (2700 K) and cool white light (6500 K) is mixed, this does not result in a "true" neutral white with 4000 K.

The resulting mixed light merely suggests to our eyes that it lies between warm white and cold white - like how the human eye can be made to believe that a mixture of red and green light is yellow.

Lightspot's SLA technology makes it possible to produce any desired color temperature with a spectral distribution that lies on the blackbody curve. Or to put it another way: the correlated color temperature practically becomes a real one again: CCT = CT.

SLA technology is therefore perfectly suited to generating LED light with the optimum spectrum for any time of day. But it's not just the spectrum and color temperature that always match perfectly – all Lightspot LEDs that produce physiological light can offer optimum color rendering across the entire range of test colors from R 1 to R 15 (this corresponds to Re)!

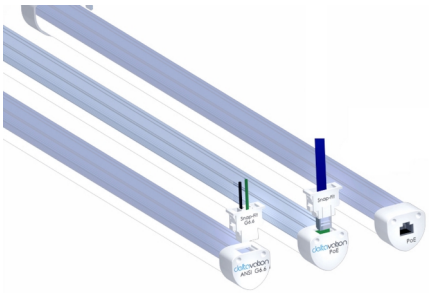
The color rendering index for the SOL and PW series is CRI/Re> 98 for all available light colors.

The main difference between the SOL and PW series is the extended non-visual component in the near infrared (in PW). This makes the SOL ideal for all areas where, in addition to a broadband spectrum and outstanding color rendering is also increasingly about brightness and energy efficiency. The PW series is recommended the best physiological quality of light is required that can be achieved with LEDs today. ■

Snap-Fit PoE Mounting PoE Enabled Linear Lamp

deltavation.com

Early generation linear LED lamps do not offer optimal lighting performance (e.g., beam intensity, spread, uniformity). They are designed with all LEDs pointing straight downward resulting in a narrow 120-160 degree of light spread with significant reduction in off center light intensity. Inferior performance has contributed to slow adoption of linear LED lamps in the commercial market. Deltavation's patented V-design provides multiple LED boards oriented to distribute uniform light over 290 degrees usable lumens. The high intensity and wide beam angle of these lamps permits lower power operation for improved efficiency.



The design includes a protected internal chamber suitable for mounting a driver circuit and a wide range of smart lighting electronic components. An end cap connector board eliminates wire connections and supports plug-and-play connectivity to all internal components. Smart lighting components are easily integrated directly into lamp, which is significantly less expensive than replacing fluorescent fixtures with smart integrated, LED fixtures. This format also supports future technology advances by allowing lamps to be upgraded without replacing fixtures.

Networked lighting providers are unable to deploy their automation technologies using linear LED lamps. Conventional fluorescent lamp infrastructure provides no way to connect the lamps directly to the network. Providers began deploying a variety of non-standard, customized integrated LED luminaires containing Ethernet connections. However, replacement LED luminaires are costly to manufacture and require removal of the fluorescent fixtures to install. Their performance varies widely, and LED luminaires cannot be upgraded to keep pace with advances in LED and automation technologies. Deltavation developed a sensible cost effective solution to these issues by extending its Snap-Fit connector system to networked PoE linear lighting applications.

The base connector of the Snap-Fit PoE system has an integrated Ethernet jack, and the leading end is an Ethernet complaint plug, which seats in a second jack internal to the lamp end cap. This provides networked power and data connectivity directly the lamp and unlocks efficiencies never before possible by using Ethernet cables to both power and control LED lamps, without the need for a complete fixture replacement. The corresponding Delta PoE T lamps provide for mounting smart lighting componentry internal to the heat sink and includes end cap connector boards to facilitates power and data connectivity to all components. Adaptive design suitable across all fixture manufacturers (existing fixture designs require minimal redesign for POE compatibility). ■

mwConnect Introduces Multi-Platform Cloud Application for Networked Lighting

mwconnect.us

The mwLink Lighting Control Dashboard is a cloud application that provides facility managers and network administrators with a wealth of operational data from their networked lighting control systems. These include occupancy state and history, energy consumption state and history, automated demand response, fault detection and reporting, and predictive maintenance reporting.

The dashboard supports multiple lighting control network types as well as an Open API for third party integration, re-affirming the company's commitment to advancing interoperability in networked lighting controls. The app is subscription based, with optional add-on data features, so users can customize the feature set that works best for them. Multi-level access ensures that users can define appropriate roles for administrators or daily operators. Reports can be customized by area and are downloadable as .csv files

with data reporting intervals of 15 minutes. Because the tool treats indoor and outdoor products as a unified system, it delivers this data for both indoor and outdoor lighting networks, enabling users to manage their indoor and outdoor lighting from a single pane of glass.

“We’re excited to introduce this product in time for the 2025 Lightfair conference,” said Stephen Zhou, Executive Vice President. “Our dedicated development team has worked very hard to include vital functionality, such as the unique ADR capability and its ability to support multiple network platforms.”

About mwConnect
An American company based in Sacramento, mwConnect has produced superior lighting controls and related electrical power and protection components for 40 years. Today, mwConnect is engineering IoT solutions for today’s rapidly changing marketplace. As an award-winning solutions provider with advanced design and manufacturing facilities in strategic global locations, mwConnect offers the most comprehensive wireless mesh solutions available in the marketplace. The company continues to support its long-time OEM partners with an extensive and essential lighting component product portfolio. ■

Seaborough and Luminus Devices Announce Partnership to Bring the World’s First LEDs with Nano-engineered Eu3+-based Phosphor to Market

www.seaborough.com www.luminus.com

Seaborough B.V. (Seaborough), a pioneer in nanoscience and luminescent technology, and Luminus Devices, an established innovator in advanced lighting technologies, announce a partnership which aims to bring the world’s first LED with nano-engineered Eu3+-based phosphor to market on a commercial scale.

This new partnership gives Luminus Devices early access to Seaborough’s unique phosphor technology, EuroLED™, which will unlock high quality, more sustainable, warm white LED lighting applications. By testing the patented phosphor technology in Luminus Devices’ LED packages, Seaborough will accelerate the development of its EuroLED™ technology. Both parties expect their collaboration will enable the scale up and global launch of the first LED lighting applications produced with EuroLED™.

Seaborough’s EuroLED™ technology is a patented nano-engineered Eu3+-based phosphor solution for warm white LEDs, which emits unique narrow-band red light. With this, EuroLED™ provides 10% to 20% more lumens per watt than existing phosphors in the CRI 80-90 range, making it a significantly more sustainable solution. In addition, EuroLED™ is processed without hydrofluoric acid and without oxygen restrictions.

LUMINUS

SEABOROUGH

Marie Anne van de Haar, CEO, Seaborough says, “After almost a decade of research, I’m excited to be taking this very important step forward in bringing our EuroLED™ technology to the market. We’re glad to have Luminus Devices as our trusted partner on this ambitious project and as an early adopter in this space. Bringing Eu3+-based phosphor to solid state lighting has long been a goal of the industry as it unlocks never before seen efficiencies. Luminus Devices and Seaborough share a vision that nano-engineered EuroLED™ technology can make this ambition a reality.”

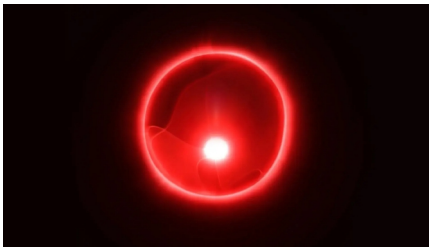
Mark Pugh, CEO, Luminus adds, ”Luminus Devices is thrilled to partner with Seaborough in introducing the groundbreaking EuroLED™ technology to the market. As an early adopter of this innovative Eu3+-based phosphor technology, we believe it represents a transformative step forward for the solid-state lighting industry. Together with Seaborough, we are paving the way for unprecedented efficiencies in lighting solutions, and we share a common vision of turning this technological ambition into a market reality. This collaboration underscores our commitment to innovation and excellence in Commercial, Residential, and Specialty Lighting markets.” ■

Making the Invisible Visible: IR:6 Sets New Standards in Infrared Technology

ams-osram.com

Infrared light, though invisible to the human eye, is crucial for many modern technologies. IR:6 introduces a true innovation that enhances performance, efficiency, and image quality in applications such as facial recognition, smart sensors, and energy-efficient systems.

Modern technologies require powerful light sources, even those we cannot see. IR:6 delivers more brightness, lower energy consumption, and improved image quality. Its optimized LED architecture and additional 920nm technology set new benchmarks in terms of range and reliability, especially in security-critical applications. IR:6 is more than just an upgrade; it offers tangible improvements across various fields. Sharper images, longer battery life, and optimized sensor technology are just a few benefits. IR LEDs powered by IR:6 produce brighter, clearer images, enabling accurate facial recognition and enhancing security systems. This results in sharper surveillance footage and more reliable object detection, even in low-light conditions.



Efficiency is key to sustainable technology. With reduced power consumption, IR:6 significantly extends the battery life of portable devices, benefiting wearables, laptops, and smart security systems. The new 920nm technology ensures an optimized balance between range and image quality, allowing infrared cameras to capture finer contrasts and details, reduce unwanted reflections, and improve the reliability of security and identification systems.

Various application fields with IR:6 technology:

- The OSLON® Black series provides great variety and power options, making it suitable for different needs in the in-cabin applications for automotive or security applications for industry and consumers.
- The OSLON® P1616 is a top performer with a superior package size to performance ratio, combining a compact footprint with high power emission.
- The SYNIOS® P2720 with lens combines compact footprint with high power and can be used for access control and biometric applications.

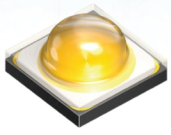
With IR:6, ams OSRAM proves that innovation is its driving force. This chip not only makes existing technologies more powerful, but also more sustainable. ■

You may send your international lighting news to editors@led-professional.com

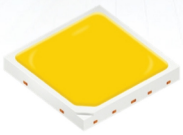
High power for high performance.

Choose the **best**.
Choose **ams OSRAM**.

High-power LEDs with high performance, superior robustness and long lifetime.

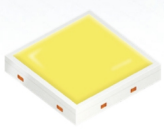


OSLON® Square White



OSCONIQ® S 5050

DURIS® S 8



OSCONIQ® C 3030

ams OSRAM

ams-osram.com

Zhaga's Vision for the Future of Connected Lighting – Heinrich Thye, Secretary General of the Zhaga Consortium

Heinrich Thye:
"Standardization isn't about limiting innovation — it's about enabling scalable, future-ready lighting solutions across the globe."

In this exclusive interview, Heinrich Thye, Secretary General of the Zhaga Consortium, shares insights into the organization's latest developments, its role in driving standardization in the lighting industry, and the importance of interoperability for future-proof lighting solutions. Discover how Zhaga is shaping the future of smart, sustainable, and connected lighting systems.

www.zhagastandard.org

LED professional: **Can you share a bit about your professional background and what led you to your current role at the Zhaga Consortium?**

Heinrich Thye: My career has always been driven by a passion for innovation and staying closely connected to market needs. After 12 years in the electrical industry as Head of Strategic Marketing at the DEHA Group in Germany, I took on the role of Managing Director at IDEE GmbH, a leading European group of electrical wholesalers. For over 16 years, I had the privilege of guiding IDEE's growth into a well-recognized leader in the European market.

When the time came to hand over this role to my successor, I was excited by the opportunity to take on a new global challenge as Secretary General of Zhaga. What attracted me to this position was the chance to work at the forefront of the lighting industry, collaborating with manufacturers, experts, and industry leaders worldwide. At Zhaga, we focus on developing specifications that enhance the interoperability, serviceability, and future-proofing components of LED luminaires. It's incredibly rewarding to be part of a consortium that fosters open and smart standards through collaboration, and pursues the purpose to enable new markets for connected and serviceable lighting through interoperability.

Looking ahead, I'm excited about Zhaga's continued role in shaping the future of lighting, ensuring our industry remains adaptable and ready for the challenges of tomorrow!

LED professional: **What has been your key focus since becoming Secretary General, and what impact do you aim to make within Zhaga?**

Heinrich Thye: Since taking on the role of Secretary General, my key focus has been to strengthen Zhaga's position as a leading force in the lighting industry. We are committed to promoting interoperability, and circularity. We are continuously expanding our specifications to align with the evolving needs of the market. A core priority is ensuring that our members see real value in their participation— and encouraging new companies to join our growing global community.

It's been exciting to see this approach resonating with the industry. Over the past year, our membership has grown by 13%, a clear sign that companies recognize the benefits of being part of Zhaga. Around 200 lighting companies can leverage our certification program and offer luminaires and components that can be upgraded and serviced.

My goal is to make Zhaga even more relevant across the entire lighting value chain by enhancing collaboration with industry partners, reinforcing our role in standardization efforts, and promoting circularity through future-proof and serviceable lighting solutions. Ultimately, Zhaga is more than just a standards organization—it's a thriving global network of experts working together to enable a more connected and sustainable lighting future. And I'm excited to be part of this journey!

LED professional: **What are the biggest challenges you've faced leading the consortium, and what accomplishments are you most proud of?**

Heinrich Thye: One of my first challenges as Secretary General was to maintain the high quality and strong foundation that Zhaga had built over the years, while ensuring that our way of working remained efficient and well organized. As with any organization, there is always room for improvement. I am a fan of taking small steps to improve the way we work. But we are also working on the long-term development of Zhaga. The first steps have been taken. This is only possible thanks to our incredible community of experts who are passionate about making Zhaga a success. Their dedication to developing new interface specifications, which we call Books, and expanding our certification program has been truly inspiring.

One of the achievements I'm most proud of is how this professional and collaborative approach has attracted more leading companies to join Zhaga, further strengthening our consortium. Another great Zhaga success story is the completion of the new books 21 and 26, which have already attracted global interest and will have a significant impact on the industry.

Zhaga Consortium: Role, Mission & Strategy

LED professional: **How is Zhaga structurally and geographically organized, and which teams operate within the organization?**

Heinrich Thye: Zhaga is a truly global consortium, uniting lighting industry leaders from around the world to drive standardization and innovation. Our structure is designed to foster collaboration, ensure technical excellence, and create real value for the market.

At the heart of our organization is the General Assembly, where our core, so called Regular Members and Associate Members come together to take key decisions and to define Zhaga's strategic direction. Supporting this, the Steering Committee, composed of representatives from 15 regular members, ensures that our activities remain aligned with industry needs. Additionally, our Taskforce (TF) Strategy develops proposals for Zhaga's strategic growth, making sure we continue to deliver value to both our members and the broader market.

Our technical development takes place within the Working Groups, which are responsible for creating and updating Zhaga Books—our specifications. These groups consist of dedicated experts from regular member companies who contribute with their technical expertise. In addition, our TF Testing ensures a strong and reliable certification program, giving manufacturers confidence in implementing Zhaga standards. The Promotion Working Group develops communications activities driving the awareness of the Zhaga solutions and their acceptance.

Geographically, Zhaga has a strong international presence with members from across EMEA, Asia and the Americas, including many global players. The TF North America and TF China oversee all regional activities. Our administrative office is located near New York City. We have many key players from the Americas, a strong footprint in Europe and we are seeing exciting growth from Asia and Australia.

Collaboration is at the core of everything we do. Zhaga works closely with other leading consortia such as DALI, TALQ, and ANSI, strengthening interoperability across the value chain of the lighting industry.

LED professional: Is Zhaga essentially an industry specification, or has it already been standardized in certain areas?

Heinrich Thye: Zhaga started as a consortium for industry-driven specifications, but over the years, it has evolved into a key enabler of standardization in the lighting industry. While many of our Zhaga Books serve as industry specifications that foster interoperability, several have already been adopted as international standards, reinforcing their importance on a global scale.

A great example is Zhaga's collaboration with the IEC. Book 7, Book 10, Book 12, Book 14 and Book 18 Ed. 1 have been accepted and implemented as IEC standards, ensuring broad industry adoption and regulatory recognition. This is an attestation of the high quality and market relevance of our work.

LED professional: How does the Zhaga Consortium contribute to the lighting industry, and what unique value does it bring to manufacturers and end-users?

Heinrich Thye: The Zhaga industry specifications, called Books, address the interfaces of components in LED luminaires. **Figure 1** illustrates the scope of the Zhaga Book 18. This Book specifies the mechanical, electrical and communication interface between a luminaire receptacle and sensing/communication modules, for outdoor luminaires. Similarly, Zhaga Book 20 defines the key interfaces for sensor and communication modules for indoor luminaires. Other Zhaga Books address other components like LED modules and optics.

For manufacturers, Zhaga provides a clear framework that simplifies product development, reduces time to market, and ensures interoperability across different suppliers. Our certification program adds an extra layer of reliability, giving manufacturers confidence that their products meet industry-wide standards.

For professional end-users, Zhaga's work translates into more flexible, sustainable, and cost-effective lighting solutions. By promoting interoperability and serviceability, we enable longer product lifespans and easier maintenance, supporting the industry's shift toward circular economy principles. This means better lighting solutions with lower environmental impact—something that benefits everyone.

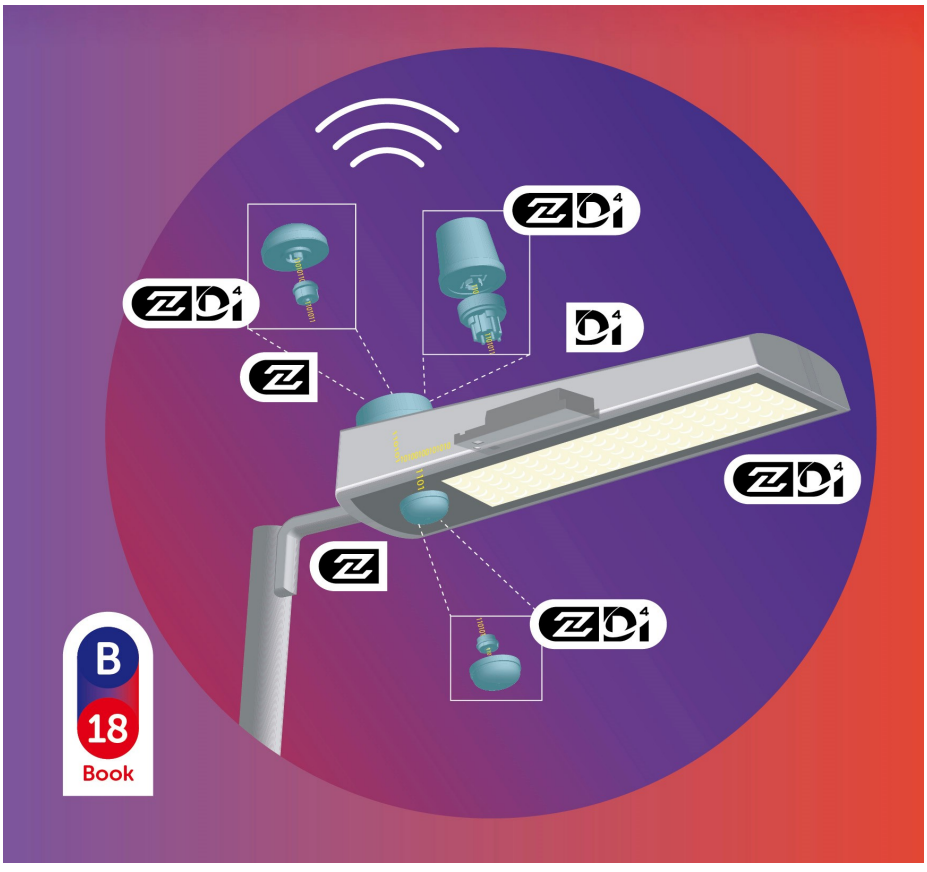


Figure 1: Scope of the Zhaga Book 18.

LED professional: Can you elaborate on the role of Zhaga Books in standardizing LED lighting components, and how these standards benefit the industry?

Heinrich Thye: One of the key benefits of Zhaga Books is that they simplify product development for manufacturers. Instead of creating proprietary solutions, companies can rely on standardized interfaces, reducing R&D costs and speeding time to market. In many cases, manufacturers also buy components. Standardized interfaces support supply chain resilience, as we can use different suppliers for the components of LED luminaires and streamline the production process. This allows for a more open and competitive industry where manufacturers can focus on innovation rather than compatibility challenges.

LED professional: Zhaga has strong partnerships, including with DALI and TALQ Alliances. How do these collaborations shape the ecosystem of connected and smart lighting?

Heinrich Thye: Collaboration is key to driving innovation in the lighting industry, and our partnerships with organizations like the DALI Alliance and the TALQ Consortium play a crucial role in shaping the ecosystem of connected and smart lighting. By working together, we ensure that different technologies and standards are aligned, making it easier for manufacturers, lighting designers, and end-users to adopt future-proof and interoperable solutions.

Our partnership with the DALI Alliance, for example, enables the seamless integration of Zhaga-defined interfaces with DALI-based control systems. This ensures that LED drivers, sensors and communication modules can communicate effectively, creating smarter, more adaptable lighting solutions. Similarly, our collaboration with TALQ supports interoperability in smart city applications, ensuring Zhaga-compliant outdoor lighting systems can be easily integrated into broader urban infrastructure networks.

These collaborations bring tremendous value to the industry by reducing complexity and enhancing compatibility. Instead of dealing with proprietary solutions, manufacturers can develop products that work across different platforms, accelerating innovation and market adoption. For end-users and city planners, this means more efficient, scalable, and future-ready lighting systems.

At Zhaga, we strongly believe that an open interface standardization approach is the best way to drive progress. By aligning with other industry leaders, we help create a connected, intelligent lighting ecosystem that supports sustainability, flexibility, and long-term value for all stakeholders.

LED professional: How has the adoption of Zhaga standards evolved over the years, and what challenges remain in achieving broader industry compliance?

Heinrich Thye: Zhaga has come a long way since its inception, and we are proud to see our standards being widely adopted across the lighting industry. Over the years, we have expanded our portfolio of Zhaga Books to address evolving market needs, from LED light engines to smart and connected lighting solutions.

One of the key milestones in our journey has been the growing number of Zhaga-certified products on the market. Today you may find more than 1000 Zhaga certified products or product families in our database with a good growth every year.

Of course, challenges remain. Some companies still rely on proprietary solutions, which can slow down the transition toward a more interconnected and sustainable lighting ecosystem. Educating the market about the long-term benefits of standardization remains a key focus for us.

Looking ahead, we are committed to further driving adoption by continuing to develop industry-relevant specifications, strengthening our partnerships, and showcasing the real-world benefits of Zhaga compliance. With the lighting industry moving towards greater connectivity and sustainability, we believe Zhaga will play an even bigger role in shaping the future!

Technology & Market Trends

LED professional: Zhaga announced the publication of Book 26 (November 2024) and Book 21 (March 2025), comprehensive standards for linear socketable LED modules for non-SELV and SELV applications. These new specifications aim to future-proof luminaire design by standardizing interfaces, ensuring interoperability, and facilitating easier maintenance and upgrades. Can you elaborate on these new specifications?

Heinrich Thye: Absolutely! We are very excited about the releases of Zhaga Books 21 and 26, which marks a significant step toward future-proofing luminaire design. These new specifications are all about standardization, interoperability, and sustainability, ensuring that manufacturers, designers, and maintenance professionals can rely on easy serviceable linear LED modules.

Books 21 and 26 specify fully interoperable LED modules with standardized interfaces (**Figure 2**) that define the op-

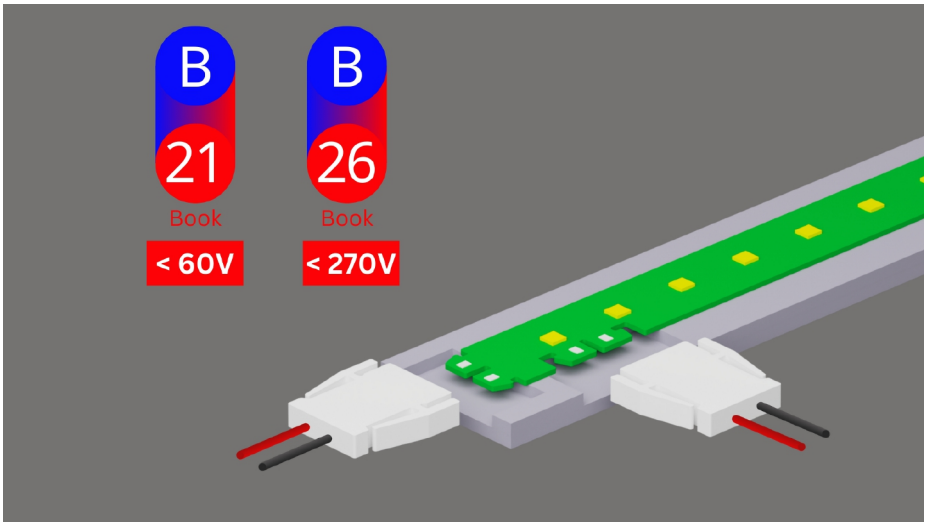


Figure 2: Books 21 and 26 specify fully interoperable LED modules with standardized interfaces that define the operating conditions and options for electrical connection and mechanical fixation.

erating conditions and options for electrical connection and mechanical fixation, making luminaire assembly and maintenance much more efficient and cost-effective. By aligning on key mechanical, electrical, and thermal parameters, we ensure that modules from different vendors can be easily integrated, replaced, or upgraded—helping to extend the lifetime of luminaires **and** reduce electronic waste.

Key Benefits of Zhaga Books 21 and 26:

- Interoperability & Flexibility – With standardized electro-mechanical interfaces, LED modules from different suppliers can be used interchangeably. This means easier upgrades and greater design flexibility for manufacturers.
- Different Module Lengths – The specification supports 1 to 5 ft module sizes with recommended lumen packages, allowing for diverse luminaire designs—from troffers to slim linear lighting.
- Multiple Contact Area Options – Modules can be connected at either the long side (for seamless lighting applications) or the short side (for ultra-slim linear luminaires), making them ideal for track lighting systems.
- Future-Proof & Serviceable – Unlike traditional integrated luminaires, both Books enable simple module replacement, making maintenance easier for electricians, facility managers, or OEMs. This approach supports sustainable lighting by reducing waste and prolonging product lifespans.
- Supports Different Voltage Applications – While Book 21 addresses SELV applications (<60V), Book 26 extends compatibility to non-SELV systems (<270V), expanding its usability across various lighting applications.
- Poka-Yoke Feature – To ensure correct installation, both Books include exclusionary mechanical and electrical alignment means between modules and luminaires, enhancing reliability and safety.
- Thermal & Photometrical Reliability – The specifications include guidelines for thermal and luminous flux performance, ensuring that different module and luminaire combinations work efficiently together.
- With Books 21 and 26, we are taking another big step toward sustainability, reinforcing Zhaga's commitment to making lighting more serviceable, modular, and environmentally friendly. By enabling multi-vendor spare parts and plug-and-play upgrades, we help manufacturers and end-users reduce waste while embracing a circular economy approach in the lighting industry.

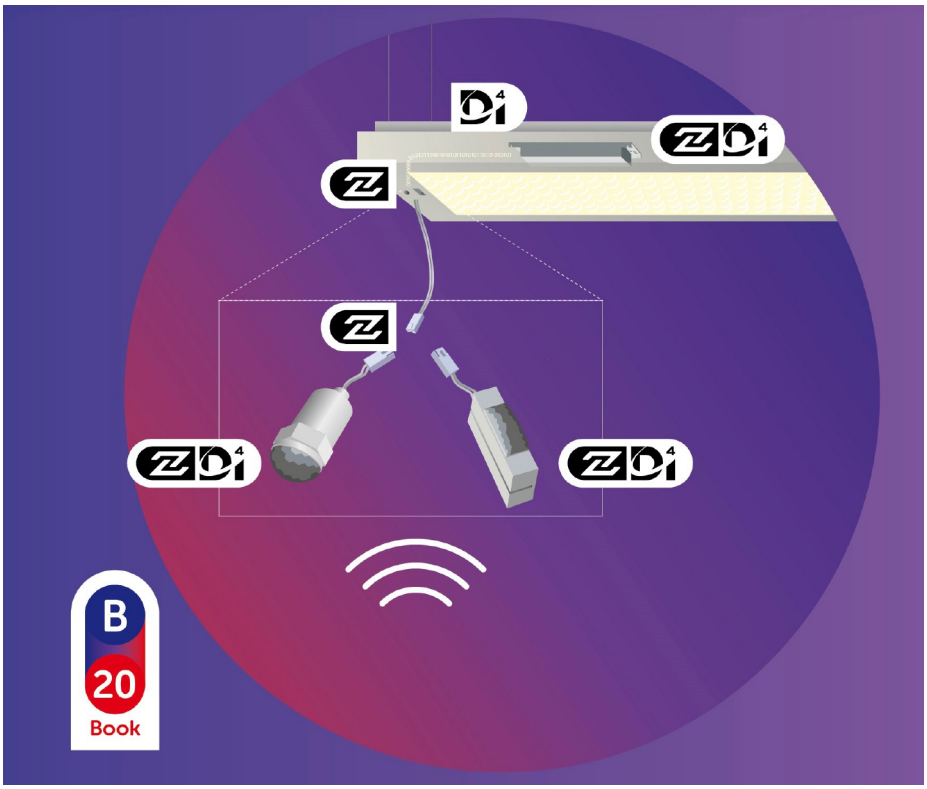


Figure 3: The U.S. Department of Energy has made Book 20 mandatory for participating in the ongoing L-Prize, a competition that awards $12.8 million in cash prizes.

LED professional: How does Zhaga support the transition towards smart lighting, and what role do standard interfaces play in IoT-based lighting solutions?

Heinrich Thye: Zhaga is playing a key role in the transition towards smart lighting by providing standardized interfaces that enable seamless integration of IoT-based lighting solutions. As the industry moves towards more connected and intelligent lighting systems, interoperability and futureproofing become essential. That's exactly where Zhaga adds value.

By developing standardized interfaces, such as those defined in our Zhaga Books, we make it easier for manufacturers to create smart and upgradeable luminaires. A great example is Zhaga Book 18, which defines a standardized interface for sensor and communication modules in outdoor luminaires. This allows cities and municipalities to deploy smart lighting infrastructure that can be easily upgraded over time—without replacing entire luminaires.

Another example is Zhaga Book 20, which is the Book 18 equivalent for indoor lighting. The U.S. Department of Energy has made Book 20 (**Figure 3**) mandatory for participating in the ongoing L-Prize[1], a competition that awards $12.8 million in cash prizes across three distinct phases: Concept, Prototype, and Manufacturing and Installation.

Standardized interfaces play a crucial role in IoT-based lighting because they allow devices from different manufacturers to work together effortlessly. Instead of being locked into proprietary systems, lighting professionals can mix and match components, ensuring long-term compatibility and reducing costs.

This approach not only accelerates the adoption of smart lighting but also supports sustainability and circular economy principles by making lighting systems more adaptable and serviceable.

[1] https://americanmadechallenges.org/challenges/lprize

LED professional: With increasing emphasis on sustainability, how does Zhaga contribute to extending product life cycles, repairability, and energy efficiency?

Heinrich Thye: At Zhaga, we embrace the principles of the circular economy, which aims to reduce resource consumption, extend product lifetimes, and minimize e-waste.

We call our approach "Circularity Lighting" (**Figure 4**), a concept that ensures LED luminaires and lighting management systems are repairable, upgradable, replaceable, and durable.

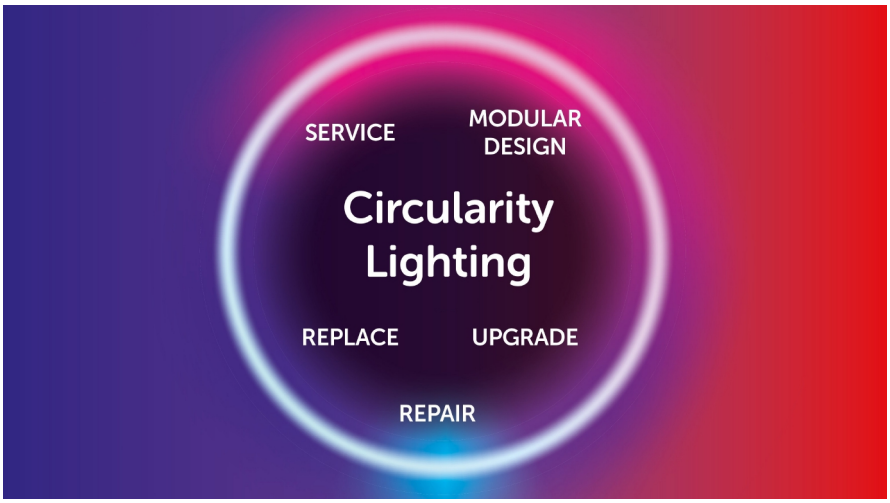


Figure 4: Zhaga embraces the principles of the circular economy, which aims to reduce resource consumption, extend product lifetimes, and minimize e-waste.

To achieve this, interface standardization is key. By defining modular, widely recognized component interfaces, Zhaga Books create a seamless, interoperable ecosystem where luminaires, LED modules, control gear, and sensors can be easily integrated, maintained, and upgraded over time. This approach helps 'close the loop' in the lighting industry, supporting a sustainable, service-based business model.

Zhaga provides practical solutions for extending the lifespan of, for example, outdoor luminaires, with key specifications such as:

- Book 13 – Standardizes the key interfaces of LED drivers form factors, ensuring easy replacement and compatibility across different luminaires.
- Book 18 – Defines the interface for control devices in streetlights, enabling plug-and-play integration of sensors and communication nodes.
- Book 19 – Sets the standard for Ingress -Protected (IP) LED modules and lens plates, eliminating the need for additional covers while allowing luminaires to be refurbished with new module-lens combinations.

By using these specifications, outdoor luminaires can be maintained, upgraded, and repaired, significantly prolonging their service life while supporting the transition toward more sustainable lighting solutions.

For indoor lighting, Zhaga's modular approach ensures that luminaires remain versatile and future-proof:

- Book 7, Book 10, Book 12 (IEC Standard 63356-2) & Book 14 (IEC Standard 63356-1) – Define modular LED light sources that allow for easy upgrades and replacements in linear and square luminaires that could be used in indoor lighting.
- Books 21 and 26 – Introduces a cost-effective, toolless replacement system for linear LED modules, making maintenance and upgrades effortless.
- Book 20 – Enables smart connectivity together with the D4i certification by the DALI Alliance between indoor luminaires and sensing/communication nodes, facilitating adaptive and efficient lighting solutions.
- Book 24 & Book 25 – Focus on wireless Near Field Communication (NFC) solutions, allowing both manufacturers and installers to configure LED drivers, track lifecycle data, and adjust operating parameters without physically replacing components.

These features enable seamless energy efficiency upgrades, ensuring luminaires stay relevant and functional for years, reducing waste while maximizing performance. Zhaga's standardized interfaces promote field-repairability, multi-vendor compatibility, and long-term serviceability, ensuring that luminaires remain efficient, adaptable, and environmentally friendly. By enabling easy component replacement, smart upgrades, and plug-and-play solutions, we are driving the shift toward a circular lighting economy.

LED professional: What is the importance of Zhaga-standardized LED drivers/controls with D4i, and how do they help ensure future-proof lighting systems?

Heinrich Thye: Zhaga-standardized LED drivers with D4i play a crucial role in ensuring future-proof, smart, and interoperable lighting systems. By combining Zhaga's standardized interfaces with D4i-certified LED drivers, we enable a plug-and-play approach that simplifies integration, enhances functionality, and supports long-term sustainability.

D4i, developed by the DALI Alliance, ensures that LED drivers can store and exchange valuable data related to energy consumption, diagnostics, and asset management. When paired with Zhaga Book 18 compliant interfaces, these drivers seamlessly connect with sensor and communication modules, making it easy to upgrade luminaires over time without replacing entire systems.

A joint Zhaga/DALI certification program, Zhaga-D4i provides manufacturers and end users with the confidence that LED luminaire components will work together seamlessly. For cities and building owners, Zhaga-D4i systems offer long-term flexibility - allowing lighting installations to evolve as technology advances, whether for energy optimization, adaptive lighting control or integration into smart city platforms.

LED professional: Zhaga attended the Smart City Expo World Congress and the IES Street and Area Lighting Conference last year. Is Zhaga now placing a particular focus on outdoor lighting?

Heinrich Thye: Zhaga Book 18 is certainly a success story, and outdoor lighting has become an important focus for

Zhaga. Our participation in events like the Smart City Expo World Congress and the IES Street and Area Lighting Conference reflects our commitment to shaping the future of smart, connected outdoor lighting.

Our Zhaga Book 18 specification, for example, provides a standardized interface for sensor and communication modules, allowing cities to integrate adaptive lighting, energy monitoring, and IoT-based functionalities into their existing infrastructure. This means that municipalities and lighting operators can future-proof their streetlighting systems, adding new capabilities without replacing entire luminaires—a key advantage for sustainability and cost-effectiveness.

While outdoor lighting is a strong focus area, our mission at Zhaga remains broad and future oriented. Whether it's outdoor, indoor, or industrial lighting, our goal is to provide sustainable, and future-ready solutions.

We've seen tremendous interest from the market, and we're excited to continue driving the deployment of the Zhaga Book 18.

LED professional: As technology rapidly evolves, how does Zhaga balance the need for standardization with the flexibility required for innovation?

Heinrich Thye: At Zhaga, we see standardization and innovation not as opposing forces, but as complementary drivers of progress. Our goal is to create interface standards that provide a strong foundation for interoperability while leaving room for continuous technological advancements.

One way we achieve this balance is through our modular approach to standardization. Zhaga Books define key interfaces—such as mechanical, electrical, thermal and communication aspects—without limiting manufacturers' ability to innovate within those parameters. This ensures that new technologies can seamlessly integrate into existing infrastructures while still allowing room for differentiation and added value.

For example, with Zhaga Book 18, we standardized the interface for sensor and communication modules in outdoor lighting, ensuring plug-and-play compatibility. However, manufacturers still have the freedom to develop new smart features, adaptive lighting functions, and IoT capabilities without being locked into a single proprietary system. Similarly, our collaboration with the DALI Alliance on Zhaga-D4i creates a unified framework for smart luminaires, while allowing continuous advancements in lighting control and data analytics.

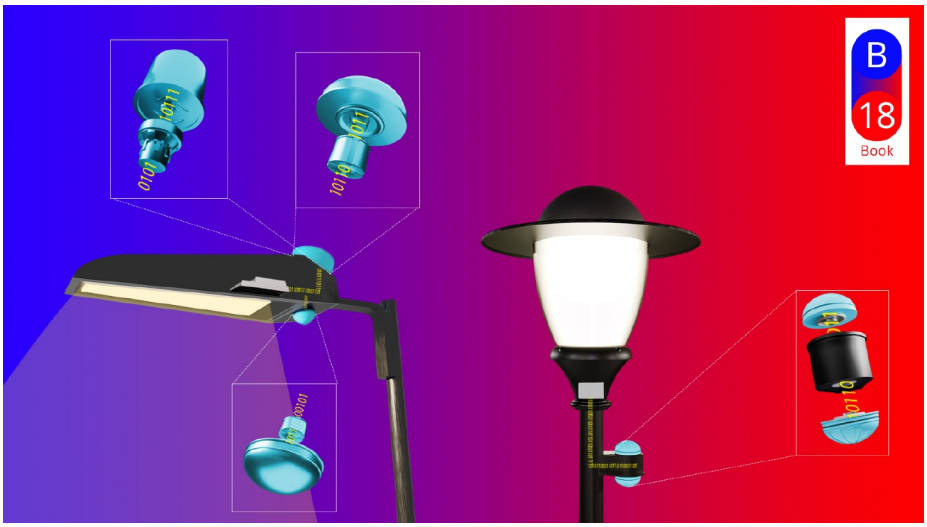


Figure 5: Zhaga plans to introduce Zhaga Book 18 Edition 4 to further optimize outdoor smart lighting interfaces with a pole-bracket solution for heritage outdoor luminaires, ensuring smart city applications.

Another key aspect is our continuous engagement with industry stakeholders. By actively listening to our members and to end users, ranging from manufacturers, specifiers to municipalities we ensure that Zhaga specifications remain relevant, forward-thinking, and adaptable. When new technological needs emerge, our Working Groups are quick to assess them and develop or update standards that support the next generation of lighting solutions.

LED professional: What standardization steps can we expect from Zhaga in the future? Which Zhaga Books are planned for release in 2025?

Heinrich Thye: Zhaga is continuously evolving to meet the industry's needs, and 2025 will be another exciting year for our standardization efforts.

Looking ahead, we are working on new Zhaga Books that will expand standardization in key areas. For example, we plan to introduce Zhaga Book 18 Edition 4 to further optimize outdoor smart lighting interfaces with a pole-bracket solution for heritage outdoor luminaires, ensuring smart city applications.

Additionally, we are exploring new specifications (**Figure 5**) for serviceable round shaped LED modules and solutions for optics.

Another important focus is to strengthen our collaboration with global standards organizations such as the DALI Alliance, TALQ and IEC to ensure that Zhaga specifications are aligned with wider industry requirements, such as a seamless data stream from the luminaire to the city management system and extend its relevance on an international scale.

Ultimately, our goal is to continue providing flexible and innovative standardization that supports manufacturers, lighting designers, and city planners in creating smarter, more efficient, and long-lasting lighting solutions. Stay tuned—2025 is shaping up to be another milestone year for Zhaga, and we are excited about the impact these new standards will bring.

LED professional: Thank you so much for this exclusive and extensive interview about you, your profession and about Zhaga. It was a pleasure talking with you.

Heinrich Thye: Thank you very much. It was also a pleasure talking with you. ■

ZHAGA Consortium

www.zhagastandard.org

The Global Information Hub for Lighting Technologies & Design

LED professional is the comprehensive publication and platform, connecting experts in the design, testing, production and commercial application of the latest lighting technologies & design information from around the world.

MORE THAN

45,000

READERS

GET YOUR FREE E-MAGAZINE SAMPLE

www.led-professional.com/lpr-magazine

powered by Luger Research e.U.

European Lighting Summit 2025: Politics It's for All of Us

On 27 March, the European lighting industry, European policymakers and representatives of research institutions and civil society organizations gathered in Brussels for the latest edition of the European Lighting Summit. Hosted by LightingEurope, the trade association representing the European lighting industry, the event provided ample opportunity for interaction between European policymakers and industry leaders.

In her opening remarks, LightingEurope Secretary General Elena Scaroni set the scene for the Summit: "Politics is not just for politicians - it's for all of us". A timely motto at a time of economic and geopolitical uncertainty. It also underlined LightingEurope's commitment to bridging environmental and industrial objectives and the need for global cooperation on global issues.

Maurice Maes, President of LightingEurope and Head of Standards & Regulations at Signify, followed with a keynote address outlining the challenges and opportunities for the lighting sector. He highlighted the importance of enforcing existing EU legislation for the lighting industry and strengthening European competitiveness as the most promising opportunities for our industry today.

Global challenges and enforcement also took center stage during the keynote presentation from Frank Heijmann, Customs Counsellor at the Permanent Representation of the Netherlands to the EU. During his presentation he outlined the challenges of regulating e-commerce and the impact of the increased presence of non-compliant goods entering the European market while also proposing concrete measures to deal with the non-compliant products sold online.

Niels Ladefoged, acting Head of Unit within the European Commission's Directorate-General for Energy (DG ENER) addressed additional challenges for the lighting industry during his presentation on the future of ecodesign and energy labeling for lighting. A review of the lighting regulations on ecodesign and energy labelling is expected by the end of the year. The Commission is counting on LightingEurope's constructive approach to actively contribute to the debate. Participants were able to ask questions and actively engage with the policymaker during the question-and-answer session.

The second policymaker of the afternoon was Tommaso Bernabò, Policy Officer at DG CONNECT, who clarified the application of the EU Cyber Resilience Act to lighting products with digital components. He discussed the responsibilities of manufacturers and the development of harmonized cybersecurity standards, and also highlighted the EU's Digital Package, expected to be published in Q4 2025, which will amend and potentially simplify existing cybersecurity rules.

This was followed by a panel discussion on the upcoming phase-out of PFAS and its implementation for the manufacturing industry. The panel included representatives from different industries such as lighting, semiconductors and chemicals. Speakers made clear their desire for targeted exemptions, as a broad ban on PFAS would have significant downstream effects, including on the lighting industry, and, in particular, on small and medium-sized enterprises (SMEs). During the discussion, the global dimension of the PFAS challenge was addressed and the need for global alignment and joint efforts towards a balanced phase-out of PFAS was highlighted.

The panel discussion was followed by a presentation from a major political actor, Paulina Dejmek Hack, Head of Cabinet for Commissioner Jessika Roswall, on the EU's vision for a competitive European circular economy. The presentation centered around the upcoming Circular Economy Act and its implications on the use of secondary raw materials, recycling and recyclability of products, and rules for the transport of waste.

The afternoon was rounded off by three subsequent presentations from different stakeholders on the topic of Artificial Light at Night (ALAN). Carla Wilkins, President of IALD, Gianpiero Bellomo chair of the working group on ALAN in CEN, and Ruskin Hartley, CEO of DarkSky, showcased their expertise and own perspective during their presentations.

Following their individual presentations, the speakers joined a panel, completed by Oscar Deurloo, from Signify and representative of LightingEurope, to discuss the challenges and opportunities for harmonized rules on ALAN.

The panelists were impressively united. They all agreed that action was needed to tackle the environmental impact of poor lighting, but that legacy systems still in use should not be replaced with poor quality LED alternatives. A harmonized framework should be created that balances environmental and human needs. At the same time, regulation should not become a barrier to innovation or the use of new technologies. The panelists also discussed the shared responsibility of the different actors in the lighting industry. Good design should go hand in hand with good products and correct installation and use.

Elena Scaroni closed this memorable afternoon by celebrating the European Lighting Summit as an opportunity for dynamic engagement between stakeholders from different backgrounds and European policymakers. The discussions throughout the afternoon sent a clear message: topics of common interest require our combined attention, open conversation, and active partnership. ■

Do you want to know more about the European Lighting Summit 2025? Pictures, presentations and bios of the speakers are available at

europeanlightingsummit.com

Do you want to know more about LightingEurope and how to become a member? Visit our website at

www.lightingeurope.org

LIGHTINGEUROPE
THE VOICE OF THE LIGHTING INDUSTRY

European Lighting Summit 2025: Conclusive Remarks from Elena Scaroni, Secretary General of LightingEurope.

European Lighting Summit 2025: Panel Discussion “Challenges and Opportunities of Harmonizing Light Pollution Regulations”.

TECTON II: Zumtobel Launches the Second Generation of Its Successful Continuous-row Lighting System – Functionality, Design and Ultra-efficient Installation

The modular TECTON continuous-row lighting system has been setting the benchmark for the lighting in buildings of all kinds since 2001. Now, with the introduction of TECTON II, Zumtobel marks a new departure for lighting technology. The lighting experts have worked with the Italian design studio and engineering company Pininfarina to expand the portfolio of the universal trunking system with innovative technology, design and sustainability features, including the quick-to-install track and batten components, which are manufactured in Dornbirn, Austria, for example. A series of independently tested and certified tests showed an average of 71% and a maximum of 109% faster installation performance compared to similar products by competitors.

For more information about TECTON II
tecton.zumtobel.com

210 lumen per watt, a service life previously unheard of on the market and a significantly better TCO: TECTON II takes Zumtobel's continuous-row lighting systems to a new level with its intuitive, flexible, customizable, design-oriented, sustainable, robust and future-oriented modular system. It uses high-quality LED technology, an excellent color rendering index (CRI) and uniform light distribution to create optimum lighting conditions. Thanks to the plug-and-play design, it can be installed quickly without any tools, while its impressive energy efficiency and intelligent control options minimize power consumption. From installation and operation to end-of-life processes, users will benefit from significant savings throughout the entire product life cycle.

39,000 Kilometers of TECTON Already Installed Worldwide

Since its market launch over 20 years ago, TECTON[1] has been developed from a continuous row with fluorescent lamps into a complex system that combines general lighting, safety and emergency lighting, lighting controls, sensors and IoT components in a single, integrated solution. Zumtobel's continuous-row lighting system impresses with its timeless design, excellent efficiency, a standard installation concept and flexible retrofitting options thanks to customized and future-oriented components and technologies. From purely industrial use, it has progressed to become a versatile lighting solution for almost any area of application.
Today, TECTON is used in production and warehouse buildings, in retail, in offices and in educational, art and healthcare facilities as a customized lighting solution for every conceivable requirement. Over 39,000 kilometers of TECTON have already been installed worldwide, a distance that stretches almost once around the entire globe.

As a company with a 75-year history, Zumtobel is always pushing boundaries. Adaptation, optimization and continuous innovation are essential for staying at the top. TECTON II is Zumtobel's response to current and future market requirements and represents a decisive step towards the future. To help them develop the next generation of continuous-row lighting systems, Zumtobel has brought the Italian design studio and engineering company Pininfarina on board as a partner. "In Pininfarina, we have found a partner that perfectly complements our strengths. Zumtobel stands for a deep understanding of the lighting market and many years of experience in the development of innovative and aesthetic lighting solutions. Pininfarina contributes its individual signature, which perfectly combines technology, functionality and design," says Alfred Felder, CEO of the Zumtobel Group.

[1] https://www.zumtobel.com/PDB/Ressource/teaser/en/en/TECTON_playbook.pdf

"We wanted to create a product that is characterized by an extremely user-friendly, clear and simple design and dispenses with unnecessary curves. The design team has explored the subtle harmony between form and function and ensured that the infrastructure can adapt to different contexts. The result continues the tradition of previous models and offers significant improvements in terms of usability, design and sustainability, opening up new and unexpected possibilities for users," adds Nicola Girotti, Head of Product Design at Pininfarina.

TECTON II A Gradual Introduction of New Features

With its innovative design approach, simple installation, extreme versatility and wide range of applications, TECTON II is increasingly attracting the attention not only of lighting planners and electrical installers, but also of architects, lighting designers and building operators. Zumtobel is introducing TECTON II over a period of four years. The functions and properties of the TECTON II track, batten and light element components will be gradually expanded until 2027. The TECTON II battens will be backwards compatible with previously installed TECTON tracks. TECTON I projects thus remain future-proof, as users can upgrade them to the latest technology at any time.

TECTON II is quick and easy to assemble thanks to its tool-free installation and the ease with which accessories can be clipped in and out. The increased efficiency and greater convenience are reflected in shorter installation times and reduced costs. The fully metric system also simplifies planning and installation. Zumtobel is always focused on the sustainability of its products. TECTON II was developed strictly in accordance with the company's own Circular Design Rules (CDRs): this means using a high proportion of recycled material and reprocessing materials and components in order to conserve resources. At the same time, Zumtobel uses the CDRs to ensure that any legal requirements or guidelines that Zumtobel and its customers will face in the future regarding sustainability or as a result of the EU Green Deal have already been taken into account during the product development process.

Put Through Its Paces

The market launch was preceded by numerous series of tests involving external experts, electricians and main competitors. They each installed a 15 meter long continuous-row lighting system, recorded the installation time and calculated the average value. The results showed that Zumtobel's systems were 71 per cent faster to install than comparable competitor products. Customers benefit from considerable cost savings thanks to shorter installation times. Depending on the number of electricians used, their hourly rates and the scope of the project, the savings can be in the five-figure range.

TECTON II Scope of Services in Phase I

Tracks (trunking)

The TECTON II trunking, initially available in white and black (later also in grey and silver) with IP20 protection, offers unprecedented support for signal transmission through the continuous-row system with 15 poles. Users can choose between three versatile circuits (three pole pairs) that can be assigned as required, such as three independent DALI circuits or DALI, ELA and loudspeakers (retail application). Thanks to the configurable number of poles and the flexible use of flex circuits, Zumtobel's TECTON II provides customized solutions for a wide range of applications: from Tier 4 data centers to extreme applications and system-critical infrastructure buildings.

With just one infeed, TECTON II allows a maximum trunking length of up to 75 meters. The trunking is available in module lengths of between 1.5 and 4.5 meters in 0.5 meter increments, making it easy to achieve whatever lengths and extensions are required. The feed out function enables the flexible integration of power outputs into the lighting tracks on site. The scope of services also includes cover strips and DALI isolators.

Battens (luminaires)

The luminaires, which are also available in white and black, are offered in Wide Beam (WB), Very Wide Beam (VWB), Narrow Beam (NB) and Medium Shelf Beam (MSB) versions. For the launch, Zumtobel is supplying the luminaires in the light colors 3000, 3500, 4000 and 6500 Kelvin. The battens are available in lengths from 1.0 to 2.5 meters in 0.5 meter increments, are switchable (EVG) and dimmable (LDE), and offer low-output (LO), medium-output (MO) and high-output (HO) lumen packages.

Lighting elements

The TECTON II continuous-row lighting systems can be fitted with the following Zumtobel lighting elements: VIVO II, SCENO, RESCLITE PRO, CRAFT II, AMPHIBIA, ECOOS II, CLARIS evolution, PANOS III, along with sensors and control systems.

Well-chosen Partnership

Zumtobel has worked with Pininfarina to adapt the continuous-row lighting system to the latest requirements. The design process was highly structured and began with internal research and engagement with sales teams, stakeholders and end users to understand visual needs, power consumption and environmental considerations. The most significant improvement over the previous generation of TECTON is its greater adaptability, flexibility and user-friendliness. TECTON II was designed as a versatile infrastructure that can adapt to different environments and integrate elements from both above and below, while always maintaining excellent aesthetic and functional quality. ■

Overview of TECTON II Values & Features at the End of the Introductory Phase

Intuitive: Intuitive operation as the key to success

Intuitive and uncomplicated handling of technical solutions plays a decisive role in a positive user experience. TECTON II fulfils this requirement with the following features:

- Easy-to-install thanks to quick and tool-free installation, easy insertion and removal of parts and reduced installation time
- Fully metric system for simplified planning and installation; 100% accuracy for all system-configurable track and batten components
- Increased efficiency and improved convenience, which counteracts cost pressure and a shortage of skilled labor
- Minimal training required for installation personnel
- Power supply lines and up to three independent DALI circuits with DALI circuit breakers in each unit of the continuous-row lighting system for installation without additional parts

Flexible: Maximum flexibility in any situation

Quick plug-and-play installation of the luminaire body and accessories at all points on the track makes TECTON II a completely flexible system:

- Up to 75 meters of trunking length with one infeed
- Flexible lengths and easy expansion thanks to trunking module lengths from 1.5 to 4.5 meters in 0.5 meter increments (batten length: 1.0 to 2.5 meters in 0.5 meter increments)
- Feedout function can be integrated into the tracks on site as required
- New infeed extension kit offers more space for the cabling and a full tap to the end of the track
- Flexible installation of lighting elements at the start and end of the system; an optimized starter track and spacers allow the lighting elements to be installed with maximum flexibility
- Flexible spacers for extremely accurate adjustment of the track length to the spatial conditions – no more sawing
- Extended range of double-split lenses and optics for greater visual comfort

Customizable: Customizable for every application area

TECTON II sets a new benchmark for customizability:

- 15 poles and three versatile, fully assignable circuits for maximum flexibility for a wide range of applications
- Can be used in various environments: from Tier 4 data centers to system-critical infrastructure buildings and extreme conditions
- Simplified all-in-one node solution (L, T, X and Flex nodes) for simplified planning, installation and consistent illumination of complex structures
- Suitable for application areas with higher requirements due to CRI value 80/90, including office or retail

Design-oriented: Aesthetics meets technology

TECTON II combines innovative technology with aesthetic design for a wide range of applications:

- Development away from the industrial look to a sophisticated, modern, elegant high-end design – both architecturally appealing and discreet
- Uniform visual appearance without recesses or openings thanks to equal spacing between both the lens elements and the luminaires; 100% continuous channel
- Pared-back style and seamless design – the lighting elements are integrated as well as possible; non-illuminated elements are reduced

Sustainable: All-round sustainability

Zumtobel is consistently committed to sustainability and has developed TECTON II in accordance with its Circular Design Rules (CDRs):

- High proportion of recycled material in TECTON II
- Recycling of materials and components for an efficient use of resources
- Excellent system efficiency thanks to the combination of market-leading LED driver and lens => maximum energy efficiency/light output of up to 210 lm/W and luminous flux of up to 10,000 lumen per meter
- Environmental Product Declaration (EPD) for transparency throughout the entire life cycle
- Retrofit option: new battens can be installed on existing tracks

Robust: Designed for a long service life

TECTON II combines mechanical resistance, corrosion protection, high ambient temperature, compliance with food safety standards and noise optimization for calm, quiet workplaces:

- Long service life of 100,000 hours at L95 with almost constant light output (CLO); optimized efficiencies for optics and drivers: 95%
- IP64 protection and ball-proof impact resistance for durability and safety in challenging environments
- Increased chemical resistance; suitable for the food industry and humid/dusty environments; uniform, dirt-repellent surface; ideal for industrial environments and data centers
- Extended temperature range: can be used between -20°C and +45°C

Pioneering: Well-equipped for the years ahead

The pioneering technology of TECTON II ensures a high level of investment security:

- Full backwards compatibility and easy upgrades to newer technologies
- Timeless design that complements any building architecture
- Use of pioneering double-split lens technology

For more information about TECTON II
tecton.zumtobel.com

About Zumtobel

Our passion is to create quality lighting solutions that deliver total perfection. We are driven by a conviction that the right kind of light can create the right atmosphere in a building at any time of day or night. When tailored to people's individual needs, light becomes something of an experience. We are always exploring new ways to come up with inimitable and timeless designs and are inspired by a unique creative ambition. When working on the lighting of tomorrow, we are driven by our innovative corporate philosophy of continuously improving the aesthetics of light. With passion, a sense of beauty and a forward-looking approach, we are constantly seeking to use light to help improve people's quality of life. The Zumtobel brand is part of Zumtobel Group AG, based in Dornbirn in the Vorarlberg region of Austria. zumtobel.com

ZUMTOBEL

ZUMTOBEL

TECTON

MANUAL

“We wanted to create a product that is characterized by an extremely user-friendly, clear and simple design and dispenses with unnecessary curves. The design team has explored the subtle harmony between form and function and ensured that the infrastructure can adapt to different contexts. The result continues the tradition of previous models and offers significant improvements in terms of usability, design and sustainability, opening up new and unexpected possibilities for users”.

NICOLA GIROTTI, HEAD OF PRODUCT DESIGN AT PININFARINA.

“In Pininfarina, we have found a partner that perfectly complements our strengths. Zumtobel stands for a deep understanding of the lighting market and many years of experience in the development of innovative and aesthetic lighting solutions. Pininfarina contributes its individual signature, which perfectly combines technology, functionality and design”.

ALFRED FELDER, CEO OF THE ZUMTOBEL GROUP.

“It’s clear that the market for continuous rooflights has grown significantly in recent years. This is mainly due to the fact that applications in which continuous rooflights are used are booming, for example in the logistics, retail and data center sectors”.

KLAUS VAMBERSZKY, VP CENTRAL PLM & R&D.

tecton.zumtobel.com

75 Years of Zumtobel – In Dialogue with Alfred Felder and Karin Zumtobel

On the occasion of the 75th anniversary of Zumtobel, Karin Zumtobel, Chairwoman of the Supervisory Board, and Alfred Felder, CEO of the Zumtobel Group, talked about the value of tradition and the power of innovation with Oliver Herwig, an independent journalist and lecturer for design theory at the University of Arts Linz.

75 years of Zumtobel. The lighting group is celebrating this anniversary where Dr. Walter Zumtobel founded the company in 1950: The Light Forum in Dornbirn, a former factory hall, is home to the strong brands of the Zumtobel Group today. Here, they showcase their extensive expertise in lighting as well as the latest developments and technologies.

Dr. Walter Zumtobel lays the foundation for today's company with "Elektrogeräte und Kunstharzpresswerk W. Zumtobel KG" (Electrical Appliances and Thermoset Molding Plant) in Dornbirn in 1950. Photo: © Zumtobel Group.

Mrs Zumtobel, how do you feel about the 75th anniversary of Zumtobel? Is it a responsibility or an inspiration?

Karin Zumtobel: *"A bit of both. It is a responsibility and joy at the same time. Growing up in Dornbirn, I got to know the company as a young girl and worked at several trade fairs. Many things were inherent in my upbringing and have always been part of my everyday life. 75 years makes me proud, especially considering what has been achieved during this time. We went through many changes – and the fact that we are still here proves that we can handle change and transformation, and that we look to the future with optimism".*

Alfred Felder: *"What has made the company successful is still valid: the unconditional aspiration to design innovative lighting solutions for tomorrow. We have gone through a number of technological changes – the development towards electronics, towards LED. This is not always an easy task to tackle for a company. And that is why I am truly proud and grateful that we managed all these changes successfully. At the same time, it also entails a responsibility to keep up the success and shape the future. In this context, the Zumtobel family, as a core shareholder and with a great interest in technology and innovation, makes a significant contribution insofar as it is possible for the Management Board to think strategically and in the long term".*

Mrs Zumtobel, do you think your grandfather would feel comfortable in the company the way it is today?

Karin Zumtobel: *"I think he would be very satisfied to see how true we have stayed to his vision. The important criteria are still the same: We focus on innovation. My grandfather was an engineer himself. Insofar, technological advances are still a major topic. We strive for top quality and value open collaboration. We have stayed true to our roots. Everyone in the company feels that".*

Technology keeps advancing continuously. How do you approach lighting solutions in view of a sustainable transformation?

Alfred Felder: *"We have always focused on energy efficiency, for both our products and our solutions. Now, material aspects are also playing an increasingly important role when it comes to circular design closing loops. We generally invest in holistic solutions, taking the entire life cycle into account. Consequently, we also always invest in future projects".*

Karin Zumtobel: *"This way, we help our customers reduce their carbon footprint with the solutions we offer. And we remain a key innovation driver for sustainability, even after 75 years. Our claim is: thinking ahead. Which functionality could be in demand in ten years? We want future-proof products".*

Are material cycles part of the design from the outset?

Alfred Felder: *"When designing new products, we do make sure that key elements can be replaced and can always be upgraded to the state of the art. Existing components are returned to the material cycle wherever possible. This way, our customers will always have efficient products. And this added value has a direct impact on them".*

Light art has always been important to Zumtobel. Why is that?

Karin Zumtobel: *"First of all, it's a personal interest of my father and the whole family. Secondly, we decided very early as a brand to approach architects who look at a building holistically and care about the effect the lighting has on the building*

ZUMTOBEL Group

z.lighting

Karin Zumtobel, Chairwoman of the Supervisory Board, and Alfred Felder, CEO of the Zumtobel Group.

and its architecture. And it quickly became clear that the earlier we enter into a dialogue, the better the solutions we can develop together for a project. Special highlights include projects like currently the children's hospital in Zurich with work by James Turrell. There you experience how light changes spaces and situations. It is installations of this kind, together with architects or artists, that have always inspired us and helped us to evolve continuously".

Does this mean that art has also been a pacemaker for technological development?

Karin Zumtobel: *"Absolutely. Light artists and architects challenge us extremely: They seek perfection. They want to create an impact. This is how unique pieces or special products made in small numbers are created".*

Alfred Felder: *"It's a little like Formula 1. First, companies test new technologies and then show that it works. We also pack all of our knowledge, our experience and our engineering know-how into such projects to create something perfect, sometimes something completely new. You learn a lot when you work on high-end applications and great challenges. We create light solutions beyond the standard".*

Karin Zumtobel: *"That is why we offer architects, planners and developers solutions that create visible added value".*

Alfred Felder: *"Yes, we often have to balance architectural desires and technical feasibility. But it is exactly these challenges that motivate us again and again to make the seemingly impossible possible".*

Which qualities distinguish your employees? What would you say fits the corporate culture?

Karin Zumtobel: *"I would say: they are curious, open...".*

Alfred Felder: *"... flexible. And we all share a passion for light. There is hardly a more beautiful product than light: highly emotional and sophisticated. The technology behind it is very broad, from mechanics and optics to design, electronics and software. The mix of different talents and also the interaction between different cultures is what we stand for and what keeps us flexible".*

Karin Zumtobel: *"This way, we can also tackle the next 75 years, because we pass on the essence of what Zumtobel is about. With our profound knowledge, committed employees and partners and the high demands we place on ourselves. We want people to get together at our company to create new things and to contribute our share to a positive future".*

That means that innovation will go on and on...

Alfred Felder: *"LEDs still have a lot of potential to offer. We are in the process of becoming part of the building infrastructure, being compatible with other systems in the building. We see that many things in a building connect vertically – and we want to be part of this development. Plus, service will be crucial in the future. At some point, the moment will come when we will probably generate more revenue by providing service".*

Karin Zumtobel: *"We have to keep our finger on the pulse of time and be open to new things. And we have to remain open to share our know-how so we can play a bigger part in shaping the future together".* ■

Winners of DALI Lighting Awards 2024/2025 Announced

LED professional Editors

The winners of the prestigious DALI Lighting Awards 2024/2025 have been unveiled. The awards, organized by the DALI Alliance – the global organization for DALI lighting control – celebrate the best examples of application and technology of DALI lighting control in projects from around the world.

Paul Drosihn, DALI Alliance General Manager.

The DALI lighting control protocol offers a wide range of benefits to installers, designers, end-users and many professionals working across the lighting sector. These include improved energy efficiency, flexibility and ease of installation. One of the most significant benefits is that DALI is an open standard, which allows for interoperability between components from differing manufacturers. This also leads to further benefits of integration and compatibility.

"It is wonderful to see the tangible benefits that DALI technology is able to deliver in real-life applications and settings."

PAUL DROSIHN, DALI ALLIANCE GENERAL MANAGER

The DALI Lighting Awards champion those projects which have used DALI to leverage many of these advantages and used DALI to the best of its abilities to deliver success.

The renowned awards program was refreshed for 2024/2025, allowing for better recognition of diverse innovations and applications from across the lighting industry. Four new application categories were added to the list of awards; Residential, Commercial Interior, Industrial & Infrastructure, and Commercial Exterior. These now sit alongside innovation awards including categories Best Use of D4i, Best Emergency Lighting Integration, Best Human Centric Design, Best Integration into Other Building Systems, Innovation in Lighting, Sustainability and Energy Efficiency, Smart and Connected Lighting. Furthermore, the diversity of submissions identified the opportunity to recognize Emerging Talent – an award that highlights a newcomer with outstanding potential in the industry.

These new categories align with the growth of technologies, advancements in lighting and innovative approaches that are being adopted across the sector.

DALI Lighting Award Winners 2024/2025:

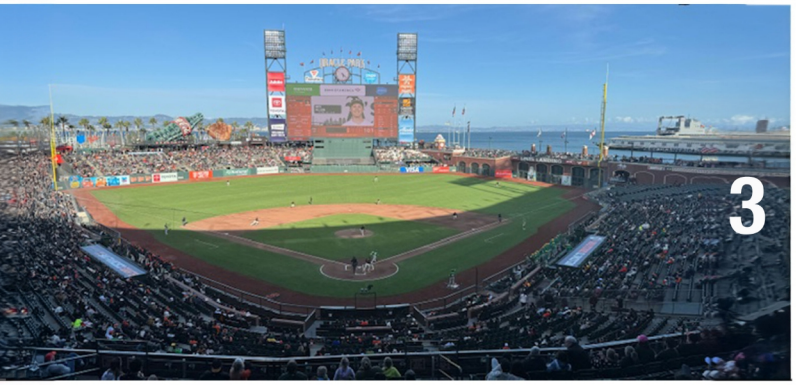
1. Residential
   Philips Dynalite - Atlantis the Royal
2. Commercial Interior
   bluebottle - 480 Swan Street + Australia Post
3. Commercial Exterior
   Synapse Wireless - Oracle Park, San Francisco
4. Industrial & Infrastructure
   Beijing Hanmingde Technology Development Co., Ltd.
5. Best use of D4i
   Synapse Wireless - Oracle Park, San Francisco
6. Best Emergency Lighting Integration
   Crown Electrical - Coogee Surf Lifesaving Club
7. Best Human Centric Design
   KUMUX & Inventronics
8. Best Integration into Other Building Systems
   Signify - BorgWarner R&D Building
9. Innovation in Lighting
   Sunricher Co.,Ltd. - zhongguancun International Innovation center
10. Sustainability and Energy Efficiency
    bluebottle - 480 Swan Street + Australia Post
11. Smart and Connected Lighting
    Beijing Hanmingde Technology Development Co., Ltd.
12. Emerging Talent Award
    Heap59 - Xray Sports

For further information please contact Jeremy Ludyjan, DALI Alliance Marketing Manager at marcom@dali-alliance.org

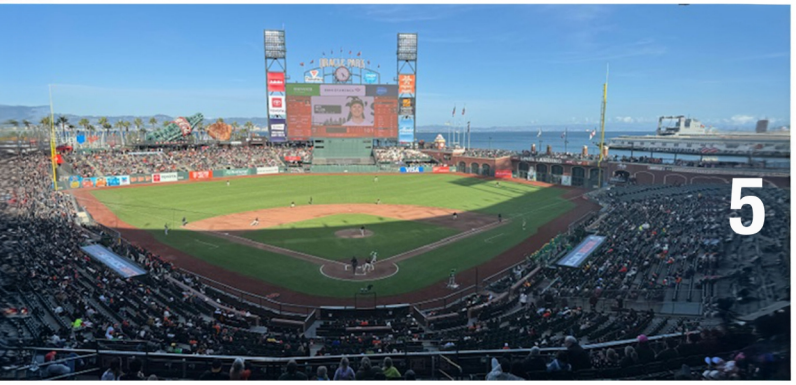
www.dali-alliance.org

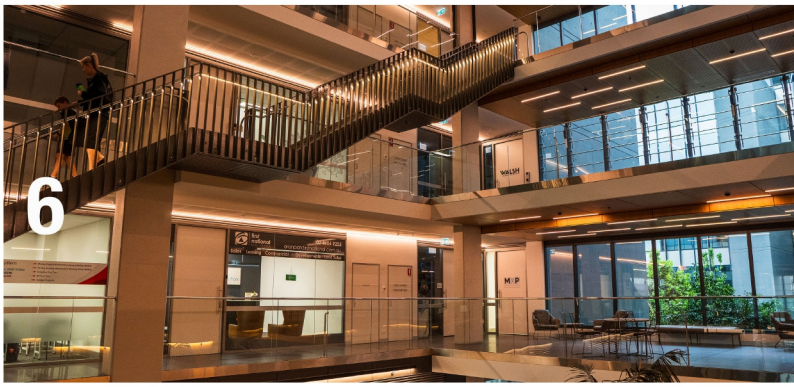

1


2


3


4


5


6


7


8


9


10


11


12

DALI Lighting Award Highly Commended 2024/2025:

- Commercial Interior
  Tridonic - Illuminating the Bibliotheca Alexandrina
- Commercial Interior
  Signify - BorgWarner R&D Building
- Best Human Centric Design
  Sunricher Co.,Ltd. - zhongguancun International Innovation centre
- Best Integration into Other Building Systems
  Lumen Resources - Willowdale Residential Aged Care
- Best Integration into Other Building Systems
  mwConnect - Exploring HVAC and Lighting Controls Integration
- Sustainability and Energy Efficiency
  Nilsen Networks Pty Ltd. - Health and Medical Research Building

The Winners and those recognized as Highly Commended were chosen by a panel of judges including lighting designers, media specialists, and global lighting experts.

Paul Drosihn, DALI Alliance General Manager said: "Our congratulations go to each and every winner and highly commended project. As always, it is not easy to choose the winners out of so many fantastic entries, and it is a testament to those taking the top spot that they stood out among tough competition." "The DALI Lighting Awards are a fantastic time to reflect on the abilities of the DALI protocol to deliver outstanding results for lighting design and control. It is wonderful to see the tangible benefits that DALI technology is able to deliver in real-life applications and settings."

The awards are just one program that the DALI Alliance runs. Lighting companies can join the DALI Alliance as a member, with two different levels; Regular and Associate.

Both membership types offer a wide range of benefits including certification and products and use of trademarks, access to DALI Alliance test sequences to enable certification, and certified products listed in DALI's online database.

Associate members can access even greater benefits such as access to draft documents, participation in work groups and beta testing, and invitation to interoperability events.

For more information on the 2024/2025 awards, visit DALI Lighting Awards 2024 - Digital Illumination Interface Alliance. The categories and submission deadlines for the 2026 awards will be announced in the forthcoming months. ■

Judges' Statements

"I was impressed by the quality and sheer scale of some of the submissions, with a strong focus on using DALI for energy savings, integration with other services and consideration of occupant wellbeing. There were some innovative projects using D4i and pushing the boundaries of what DALI can achieve."
– Jeff Shaw, Arup

"Judging the DALI Awards has been just as difficult as in previous years, with many excellent submissions demonstrating the benefits of DALI technology. Projects ranged from small residential systems, through systems of D4i luminaires with wireless connectivity, up to enormous infrastructure projects. I particularly liked the extensive use of the technical features of DALI-2 and D4i, such as standardized control of emergency lighting, color control and energy monitoring. Integration of the DALI lighting system with other building systems was also highlighted in a number of the projects. Congratulations to all winning and highly commended projects."
– Scott Wade, DALI Alliance

"I have been a judge for the DALI Awards for the past few years now, and it is always a fascinating process. I learn so much about the process of lighting controls, and each year I am always impressed by the range and scale of the projects entered. This year was no different – the standard of entries was very high, with some really interesting examples of how DALI can be used in lighting projects. Judging was no easy feat, but I am very pleased with the selections made by myself and my fellow judges.
– Matt Waring, arc

"When I was first asked to be a judge for the DALI awards it seemed just interesting enough to say yes. After reviewing the submissions from across the globe, I felt fortunate to be a part of the process. Some of the most impressive architectural achievements of our time have been submitted, and the judging process has been well-informed and fair. This is my third year, and the projects that we have recognized are worthy of any lighting professional's attention.
– Mark Lien, Illuminating Engineering Society

List of all judges: Scott Wade, DALI Alliance; Jeff Shaw, Arup; Matt Waring, arc magazine; Mark Lien, Augmented Illumination; Siegfried Luger, Luger Research.

Highly Commended in the category of Commercial Interior: Tridonic, Illuminating the Bibliotheca Alexandrina.

Winner in the category “Innovation in Lighting”: Sunricher Co., Zhongguancun International Innovation Center in China.

The Next LED Revolution – Commentary from a Key Expert

Dr. David Emerson

I remember the first blue LED I fabricated in 1996 at Cornell. It was a tiny dot, barely visible with the room lights on, barely emitting light at all. Fast forward more than twenty years to 2018 when I left Cree, and LEDs were bright enough to light stadiums. After such explosive gains, many industry experts, makers and users alike, have lamented that LED innovation is over. I say that the adage that it's hard to read the label when you're stuck inside of the jar applies. Far from the end of innovation, the LED industry is on the cusp of a new era. This time it isn't about revolutionizing a technology or a product or an application; it's about overhauling the entire LED ecosystem. Over the next ten years, consolidation will drive the emergence of a handful of LED powerhouses with global reach, comprehensive technology and product portfolios, increased market share, expanded margins, and the resiliency to navigate future industry headwinds.

The Global LED Powerhouse

LED suppliers have been largely known for one, or at most a few, defining characteristics. Highest lumens per watt. Lowest cost. Best product for a given application. Biggest scale. With what were profound differentiators now reduced to table stakes to participate, tomorrow's leaders will either develop or acquire ten pillars of excellence on their journeys to become LED powerhouses.

Leaders will no longer specialize in one, or just a few, technologies, instead offering comprehensive technology portfolios spanning deep UV to IR and low power to extreme high power. They will maintain extensive product catalogs aiming to serve all major LED applications. While mass market LEDs will continue to lead in volume, an increasing number of LEDs will be application optimized.

R&D and application functions will morph to more effectively drive innovation while also bolstering resilient intellectual property portfolios spanning the entire LED ecosystem from base materials to end applications. A fluid mix of in-house and contract resources, manufacturing will be distributed globally to minimize lead times, costs, and inventory while still being structured to protect evolving know-how. Industry leaders will provide higher levels of integration, collapsing supply chains, strengthening strategic ties between LED suppliers and users, and concentrating margin.

Diversified fulfillment networks will interface seamlessly with tens of thousands of customers, from mass market LED consumers to sophisticated designers with highly specialized requirements. Global reach will enable future industry leaders to better service end customers, both those who have extreme regional focus, like many specialty lighting companies, and those whose footprints span the globe, like many automotive OEMs.

Finally, excellent customer service, a function that remarkably few LED suppliers possess today, will be universal. Beyond managing customer returns, these customer service teams will help forge not only cross-industry but also cross-cultural international partnerships.

At each emerging LED powerhouse, these ten pillars will be championed by a leadership team galvanized behind a common goal - transformative consolidation of the LED industry.

Consolidation Has Been Happening for 20 Years...

With what was once thousands of seemingly viable LED suppliers now numbering, generously, at less than fifty, the LED industry has been consolidating for more than twenty years. The majority of the thousands, those who were either unable to invest sufficiently or who lacked the imagination to adapt to the changing marketplace, were either absorbed by the survivors or simply evaporated. The remaining fifty can be loosely categorized across three groups.

The first group consists of early industry leaders who continued to drive organic growth while often simultaneously bolting on new capabilities - technologies, products, market access, and the like – through acquisition. For example, over about a 10-year period, along with sustained internal technology, IP, and brand-building campaigns, Cree strengthened its LED business by acquiring Nitres, ATMI's GaN business, and COTCO. Others like Nichia and Osram followed similar paths.

The second group, guided by the principle that 'the big fish eats the small fish', gained huge scale and impressive capabilities over a short period. While some still lack the commercial channels for true global leadership and reach, its members, like Sanan and MLS, continue to demonstrate significant drive and determination to supplant the early leaders.

Finally, members of the third group, while not having the advantages of the early

leaders or the scale of the big fish, have survived twenty plus years of consolidation by carving out profitable market niches. Dominant Opto exemplifies this group, standing out as both a trusted second source and a source of innovative solutions.

Regardless of classification, members of all three groups and the crossovers between them are poised for prominent roles in the emergence of the LED powerhouses.

...But What's Driving Consolidation Now Is Different

Even though consolidation has been occurring for more than two decades, the industry remains fragmented. Market conditions are primed for a strategic, transformational shift. Rather than continue piecewise, the next consolidation phase must be highly intentional. Decisive winners and losers will emerge. Winners will seize the opportunities presented by converging market headwinds, exploiting them to fuel the emergence of the LED powerhouses.

Overcapacity, at an historical peak, increases the monetization potential of consolidation-driven restructuring. Trade tensions and worldwide calls to 'buy-domestic' prompt LED manufacturers to thoughtfully partner to reopen markets that have been, at a minimum, soft-closed to them. Channel over-saturation, with formerly exclusive distribution relationships replaced by multi-supplier line cards, presents the opportunity to reforge value-add partnerships benefitting not only LED suppliers but also distributors and users. Expiration of early IP, rather than a sign that IP is no longer needed, amplifies the value of patent portfolios built by those who have consistently driven innovation over decades.

While these headwinds have previously challenged the industry, they have never converged with the severity seen during the continuing post-COVID market cycle. And, unlike in the past, there is no ready relief from a new, fast-growing industry driver, no backlighting or general lighting secular trend to carry the industry rapidly out of the slump. Automotive and micro-LED emerged as potential market saviors, but the former is largely concentrated to a few suppliers and is still subject to market cycles while the overhype of the latter has reversed this promised industry-tailwind into another mid- term headwind. The stage is set for an industry transformation led by market participants, strategics or investors, who can see beyond the current downturn to the growth and recaptured profits beyond.

Many Paths

Ultimately, many of today's LED suppliers will consolidate into a handful of powerhouses through a combination of targeted internal investments, bold industry alliances, and strategic M&A. Numbering closer to ten than fifty, those that remain will each maintain home region focus while also commanding significant global market share. M&A across regional boundaries will be a priority in a market increasingly divided by trade barriers.

As a first step toward consolidation, decisively monetizing synergies shared by nearly any two suppliers can rapidly improve results and provide a springboard for the next transformational steps. For example, a newer industry entrant with ready capacity and broad product portfolio can combine with a more established partner to leverage its brand name, intellectual property, and channel. It will not be difficult to find opportunities to improve results by combining nearly any two LED suppliers.

Regardless of the path to consolidation, most important is that the drivers, whether existing suppliers or strategic investors, act decisively. Half-measures will not work. Bold moves to build a powerhouse can recapture profits that have been temporarily swept away by industry headwinds.

Conclusion

In ten years, the LED Industry will be led by a handful of LED powerhouses with global reach and broad product portfolios, increased market share and expanded, industry-leading margins. While neither the exact path to consolidation nor the number of powerhouses that will emerge is clear, the unique opportunity presented by current market conditions is undeniable. Winners will choose their paths: to acquire or be acquired. Losers will sit on the sidelines, becoming increasingly marginalized, less competitive, and ultimately irrelevant. Consolidation will further drive innovation, streamline the supply chain, and create new market opportunities. The LED industry isn't just preparing for a shift; it's on the brink of an LED Revolution that will redefine it.

My question for the LED leaders of today is; Which side will you be on? ■

Dr. David Emerson
Dave Emerson is a global technology executive who has developed and successfully deployed profitable solutions to complex technical problems in highly competitive and regulated markets. His experiences span from enterprise start-up to growing profitability at scale and include multiple turn-arounds.

A pragmatic and productive innovator, Dr. Emerson holds more than 300 patents in areas ranging from electronic materials and optoelectronic device architecture to LED lighting, semiconductor manufacturing, and biotechnology systems and treatments. Dr. Emerson holds both BS and PhD degrees in Electrical Engineering from Cornell University.

Dr. Emerson provides consulting services including market research and strategic planning, patent portfolio analysis and positioning, expert witness strategy and testimony, product development, and executive coaching.

dave@triphammersolutions.com

Disclaimer:
Dr. David Emerson was a long-term employee of Cree, Inc. and left his full-time position in 2019. This article reflects his personal opinions and not those of Cree (now Wolfspeed) or any other past or present employer.

Lighting Assessment with Drones – Application for Sport Lighting

Octavio L. Pérez, Ph.D, WELL AP (WELL Building Standard Accredited Professional) and HCL / Integrative Lighting

Professional lighting inspection and assessment is a key element in the process of lighting design, commissioning and ultimately, delivery. A lighting design installation that is not properly assessed could significantly differ from how it was designed, not only in its performance, but also in its elements and configuration. This is where the labs and inspection bodies become relevant. ISO 17025 labs will test the devices and systems, and ISO 17020 inspection bodies will assess the installed system and its commissioning and performance. Sometimes there is little understanding about the difference between the roles of both entities, and this will be the aim of a future article.

In the field of lighting assessment, the precise location of the test points, the orientation and leveling of the measuring equipment and potential shadowing of the operator are issues that can negatively affect the process.

In the case of outdoor lighting, and more precisely in sports lighting, following the ISO 12193 (Light and lighting - Sports lighting), a grid has to be laid out in the sport field to determine the location of the points of interest. In the particular case of football/soccer lighting, there are at least 96 points where different illuminance level magnitudes need to be properly "measured". This is a time-consuming process, prone to errors, and we will discuss here how an automated solution can significantly improve not only the time involved but also the accuracy of the measurements and ultimately its assessment.

I have developed an innovative solution that overcomes all these issues and that has the potential advantage of giving the final test report in a matter of seconds once the measurement process has been finalized. For this I use collaborative technologies such as advanced sensors for lighting and precise positioning, geographical information systems (GIS) and spatial databases, and drones.

Rovers and Drones vs. Human Operators

There are different types of unmanned vehicles, usually called rovers, that can efficiently follow paths and perform actions without the direct interaction of human operators.

We have to differentiate between terrestrial and aerial rovers (there are also water and underwater ones that are out of the scope of our interest). The terrestrial rovers need to be in touch with the ground and this is a limitation, particularly for occupied and furnished spaces, and for places with delicate surfaces, such as the grass or the synthetic ones from sport pitches.

Aerial rovers, also called drones, are unmanned vehicles that can fly freely without being in touch with the ground except for take-off and landing, minimizing the risk of damaging the ground surfaces, having a high degree of freedom to overcome the obstacles in the spaces. Drones can carry payload such as cameras and sensors for specialized image and data collection, and can fly with preprogramed paths and/or assisted by operators.

The system that I have developed goes one step further and, with the use of Computer Vision (CV) and Artificial Intelligence (AI) can autonomously define the flight path and even modify it dynamically, if needed. Once placed in the corner of a stadium, it can analyze the pitch orientation, carry out the perimeter measurement, define the grid and go ahead with the measurements, either by itself, or in collaboration with other drones (Swarms).

Precision GPS (RTK & NTRIP) & AHRS

The software background for this to happen is a Geographical Information System (GIS) linked with a Spatial Database for reporting and precise GPS location and attitude for the drone.

The first element is the precise GPS. A long time ago, and even nowadays, conventional GPS did not offer submeter accuracy. The advent of the RTK (Real-time Kinematic Positioning) technology, working together with services such as NTRIP (Networked Transport of RTCM via Internet Protocol) can provide centimeter and subcentimeter precise location with very compact equipment. There are applications where even these combined technologies can be used for precise 2D orientation (heading).

Other complementary technologies are the ones used for AHRS (Attitude & Heading Reference System) that give additional information about the attitude of the drone, such as acceleration, leveling and roll, pitch and yaw, usually coming as nine (9) axis devices (three gyroscopes, three accelerometers and three magnetometers).

Putting both together, AHRS and RTK GPS with NTRIP, allows the precise and leveled positioning of a drone in a sports field, with both parameters becoming part of the measurement (beyond the pure "basic" reading of the light-meter device, either a luxmeter, a spectrometer, a camera, a LIDAR or a combination of some or many of them.

Geographic Information System (GIS)

A Geographic Information System (GIS) is a software that allows the fusion of data and maps. They are a perfect tool to geotag and analyze information visually and spatially.

In the case of lighting assessment, it can become an excellent analysis and visualization tool for the measurement, rather than having to work in the typical way (like MS Excel cells, rows and columns).

In our particular application, once we have the corners and perimeter of the pitch, the software can immediately calculate the grid of interest and pass it to the drone

autopilot to dynamically define the flight path. All of this without human intervention.

Figure 2 is a real output of the software on a real pitch where I have been working on the lighting assessment.

The drone can save all the lighting data and the associated information (such as sensor temperature, battery levels, attitude and leveling, heading, etc) in real time and geolocalize it spatially. To date there are no standards for geolocalizing lighting field data. Perhaps a solution to evaluate is the EXIF (Exchangeable Image File Format) metadata standard from photography. More discussions about this particular point coming shortly.

Reporting

At the time that the drone system has completed the flight, it can either by itself, or based on a web service, send the final reports to the different stakeholders (customers, owners, event organizers, authorities, etc).

In the future, the assessment process progress could also be monitored in real time, ensuring no "data cooking".

These automated procedures ensure not only the integrity of the data, but a fast reporting, that is essential to take corrective actions if needed, allowing for adjustment of the lighting commissioning in near real time.

Conclusion

We have seen the concepts behind an innovative implementation of multidisciplinary technologies to achieve the assessment of outdoor lighting in an automated way. The information described is part of what is covered by several patent applications (patent pending).

There are "political" and safety concerns about the use of drones that will need to be overcome. This should not be a limitation in closed areas, such as sports stadiums, when the games and/or training are not happening.

We are now in the process of refining the flight paths with CV and AI, and collaborating with top universities such as KAUST (King Abdullah University of Science and Technology), and Sport Research Institutes. Our aim is to introduce this system at the FSB 2025 sports exhibition in Riyadh, Saudi Arabia (KSA). More coming soon. ■

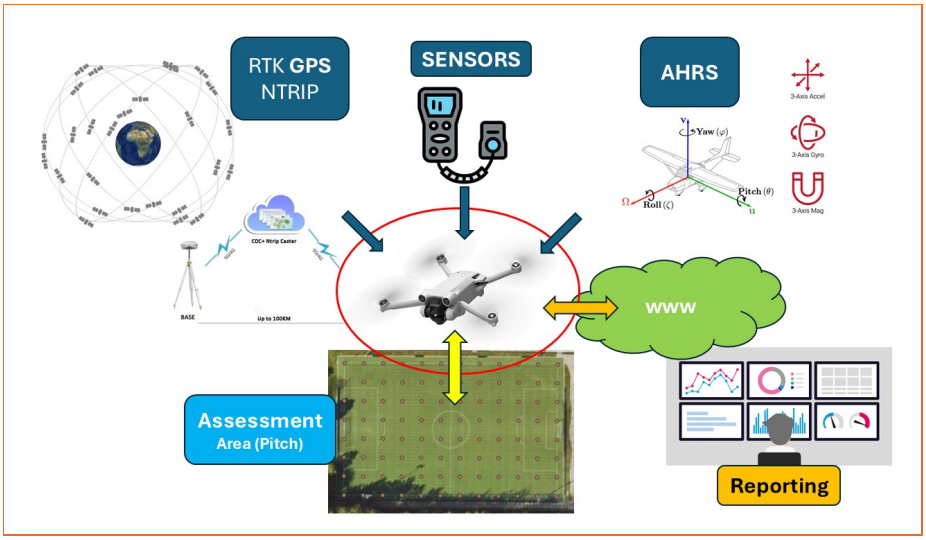


Figure 1: ...

Figure 2: Grid of a football pitch automatically generated from the coordinates.

Dr. Octavio L. Perez is a passionate professional, researcher and scholar who contributes to exploring, developing and bringing to the real world the benefits of light and lighting for human wellbeing and wellness, and ultimately health. He works internationally as an independent consultant, focused on translational research in human centric lighting (HCL), more precisely "integrative lighting". Dr. Perez is a researcher at Mount Sinai Hospital in NYC, NY, USA. and serves in several international technical committees. He is also a WELL AP (WELL Building Standard Accredited Professional), starting now in the challenging field of lighting assessment in sports venues.

https://www.linkedin.com/in/LightHealth

octavio.perez@light.health

From Calm Technology to Ambient Communication: A Vision Realized

Tapio Rosenius, Designer and Technologist, and Co-Founder and CEO of Poet Creator Software

We are stepping into the age of real-time environments. Spaces that perceive, respond, adapt and assist. These environments will communicate meaningfully and seek to drive human behavior. Not with screens or alerts, but with presence, light, rhythm, and intention. This is the foundation of ambient communication. A quiet revolution where technology recedes, and experience comes forward.

For more information visit
https://poet.software

This article is a journey through the evolution of ambient communication. From the prophetic writings of Mark Weiser and John Seely Brown to European ambient intelligence experiments, all the way to our own vision for lighting, media, and real-time spatial interaction. Ultimately, it's the story of why we built Poet Creator Software. A new way of creating, generating, and managing a new breed of visual environments, and how we believe it can help shape a more humane and expressive digital future.

The Disappearing Computer

Back in the early '90s, Mark Weiser dropped a quiet bombshell on the tech world. He proposed that the most profound technologies don't scream for attention. They disappear. He called it "ubiquitous computing." Weiser's big insight? We're better off when we can focus on what we're doing, not the technology helping us do it. He championed calmness. He wanted tech to inform us, not command us. And if that sounds radical today, imagine saying it in 1991, when just owning a beige desktop computer was futuristic.

His friend and collaborator, John Seely Brown, helped put language around this with the idea of the periphery. Great tools, they argued, don't dominate your attention. They hang out politely in the background until you need them. Their mantra? Make the interface disappear.

Ambient Intelligence and the Dream of Responsive Environments

While these ideas percolated in research labs, a wave of European visionaries stepped forward under the banner of Ambient Intelligence. Philips Research was at the forefront, helping to define a vision where environments adapt to people, not the other way around. At the same time, the European Union launched major funding programs like ISTAG (Information Society Technologies Advisory Group), which brought together experts from across disciplines to shape future tech policies around human-centric, context-aware computing.

These weren't hypothetical visions. They built real prototypes. Offices that changed lighting based on productivity rhythms. Kitchens that responded to residents' patterns. Meeting rooms that adjusted media based on the participants' roles. The common goal? Create ambient systems that are not only functional but also socially intelligent, emotionally aware, and fundamentally calm.

The Nordic Connection: Towards Digital Paradise

Our own journey toward ambient communication took a powerful leap forward in 2017 through a collaboration with VTT Technical Research Centre of Finland. As part of the Towards Digital Paradise project, we worked closely with researchers Vesa Pentikäinen and Janne Aikio. These were the first people to introduce us to the term "Ambient Communication." And what a spark it was.

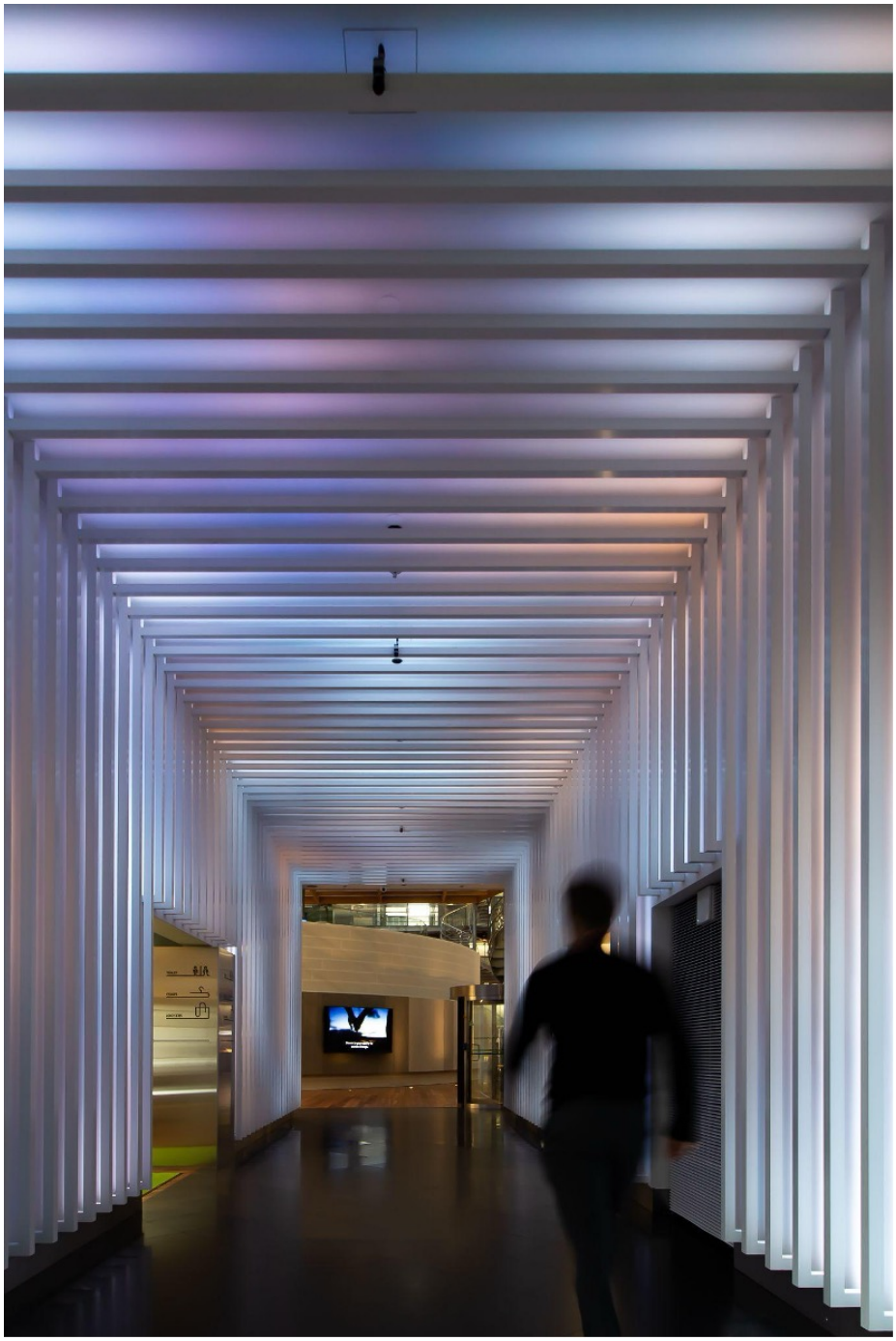
Together, we explored the possibility of spaces that could become active participants in our lives in a non-intrusive way. From elderly care scenarios to immersive hospitality concepts and responsive airports, we prototyped environments where lighting could assist and support by conveying presence and meaning. That collaboration gave shape to what we now consider the heart of our work. The belief that environments can, and should, communicate purposefully and calmly, using real-time data for instrumental benefits of all. The building user, operator, and developer.

Why We Built Poet Creator

All of this leads to Poet Creator. A system that we launched in 2020 and has already been deployed in some of the most cutting-edge architectural environments in the world.

Poet is a real-time engine and control system that lets us take data from our surroundings and online. People, sensors, movement, event data, even emotions, and translate it into meaningful lighting, sound, media, and projection. It's what makes a space not just responsive, but expressive, attentive, and assistive. And importantly, it's what makes ambient communication possible at scale.

We've used Poet to help people move more, feel more relaxed, connect more deeply, and experience places with a richer sense of presence. But these outcomes don't emerge by accident. They require design decisions informed by behavioral psychology. As the built environment becomes increasingly interactive, we see a growing need for a framework that connects environmental design with evidence-based insights into human behavior. This is what naturally leads us to the idea of the nudge.



Visitors to the headquarters of the energy company Fortum in Finland pass through a 'Transition Tunnel', an immersive and interactive ambient communication experience powered by Poet Creator that symbolizes each individual's ability to contribute to a more sustainable future. Photo: Riku Pirtilä.

Nudge: Crafting Subtle Behavioral Cues in Responsive Spaces

Nudging in the built environment refers to the use of subtle, often subconscious cues. Light, sound, movement, rhythm. To guide behavior without enforcing it. It's about setting the stage so the right action feels like the obvious choice, not an imposed one. Think less command, more gentle suggestions. It is one of the psychological models behind ambient communication and hence important to the story.

When done well, it transforms static environments into dynamic systems that communicate, adapt, and support wellbeing, sustainability, and flow.

A Case Study: Driving Positive Choice

At a workplace project in Zurich, we used Poet Creator to reimagine the staircase not as a route between floors, but as an ambient invitation to move. Putting into practice the real-time capabilities of the system together with the nudge behavioral model.

Here's how it worked:

- A suspended decorative luminaire spanning the height of seven floors was installed at the center of a spiral staircase.
- Visitors arriving at the lobby faced a clear choice. A visually open staircase or a nearby bank of elevators.
- We first measured staircase use for six months with the luminaire in a static mode to establish a behavioral baseline.
- Then we introduced a dynamic upward-pulsing light pattern and measured for another six weeks.
- Finally, we activated an interactive lighting mode where sensors triggered immediate, responsive feedback to movement. This was also measured over six weeks.

What happened?

- The upward movement pattern increased stair usage by 6%.
- The interactive mode led to an 8% increase.

Results in real impact:

- 78,342 extra calories burned over the trial period.
- 11,549 lift rides avoided, contributing to energy efficiency.
- 21 days of life extended, based on "every step up extends life by four seconds" (Harvard Alumni Health Study, 2019). Maybe not the most reliable predictor of one's lifespan, but intriguing, nevertheless.

And all of it achieved through ambient, non-verbal cues woven into the space through light. Not instructing people but suggesting. And crucially, collecting real data from the installation to prove the nudge is working.

Micro-Decisions, Macro Impact

In the end, this is about imagining new kinds of built environments leveraging intelligent lighting and media. A workplace that intuitively supports healthier habits, better energy use, inspiring collaborations, idea generation. Subtle, adaptive cues embedded in architecture that gently steer behavior toward positive outcomes. Without imposing or interrupting.

This is potentially a highly scalable framework. Every office, hospital, school, or airport can be designed to nudge us toward better choices. It turns buildings into behavioral allies.

At scale, this could mean millions of daily micro-decisions shifting toward wellbeing, efficiency, and connection. A quiet revolution hiding in plain sight.

The Future is Peripheral

In a world overloaded with sensory stimulation, we pioneer technology for dynamic and adaptive environments that influence human behavior without intrusion or provocation. Ambient communication is a way of adding measurable value into built environments.

We believe the next era of computing isn't about more attention. It's about environments that support us quietly, expressively, and beautifully. And with Poet Creator, we're building for that future.

In the next part of this two-part article, we dive into the features and capabilities of the Poet Creator software and its use cases across the built environment. From wellness-driven workplaces to ultra-intelligent stadiums. ■

Aurora at the Metropol Parasol in Seville is a nightly attraction open 365 days a year. This installation uses lighting with sensors and data to create ever-evolving immersive experiences. It has attracted over 1 million paying visitors since its inauguration and is remotely managed with Poet Creator.

Aurora at the Metropol Parasol in Seville.

Tapio Rosenius is a Finnish designer, technologist, and co-founder and CEO of Poet Creator Software. His work explores the intersection of light, data, and human behavior in architectural environments. Together with the team at Poet Creator software, he is on a mission to bring ambient communication to the everyday spaces we live, work, and move through.

tapio@skandal.tech

Powered by Poet Creator, this London office reception merges financial data with dynamic particle effects, creating a visually immersive and informative experience, while motion-tracking cameras add an extra layer of interactivity.

The Future of Repairability in Lighting: A New Standard for a Sustainable Lighting Industry

Jaap Nuesink, CE-Compliance Specialist and Process Innovator at Litecert

The concept of repairability is gaining momentum across industries, and the lighting sector is no exception. While the European "Right to Repair" directive (EU) 2024/1799 [1] primarily applies to consumer products, the lighting industry must prepare for potential regulatory changes and market-driven demands for more sustainable and repairable products. Beyond simple repairability, refurbishment and remanufacturing offer additional opportunities to reduce waste, extend product life cycles, and improve economic viability.

A new Dutch initiative, developed by DEKRA, OVLNL, and Licht en Donker Advies, introduces a robust methodology for assessing the repairability of luminaires. This method, based on EN 45554 [4], not only provides a structured approach for evaluating lighting products and guiding manufacturers in designing for long-term use, but it is also the result of extensive collaboration.

Over 30 organizations—including municipalities, consultants, contractors, manufacturers, and test houses—contributed their expertise during the working sessions. This broad-based industry participation ensures that the standard is comprehensive, widely supported, and of high value for the entire lighting sector. This article explores the legal landscape, economic and environmental benefits, and practical applications of this initiative. This standard was published in December 2024. The working group is now gathering experiences with the intent to further improve this standard and issue an update after approximately 2 years of use.

Comparison with Existing Repairability Scoring Systems

Repairability scoring systems already exist, most notably the iFixit [6] repairability index in France, which has been widely adopted for consumer electronics such as smartphones, laptops, and other portable devices. iFixit's [6] approach evaluates factors like ease of disassembly, availability of spare parts, and the quality of repair documentation—helping consumers make informed decisions about the longevity and sustainability of their devices.

However, these established frameworks have not been specifically tailored to the unique challenges of the lighting industry. Luminaires differ significantly from consumer electronics, especially when considering factors such as their specialized lighting components, and the varied repair practices required for applications ranging from desk lighting to street lighting.

The BRL Repairability standard fills this gap by developing a dedicated methodology for assessing the repairability of luminaires. By incorporating industry-specific criteria—such as accessibility of components, the availability of parts, and detailed software/firmware considerations—the BRL approach provides a more accurate and actionable evaluation for manufacturers, municipalities, and buyers in the lighting sector.

Historical Context and Evolution of Repairability in Lighting

Repairability has not always been a focal point in lighting design. Traditionally, lighting products, especially incandescent and fluorescent lamps, were designed for easy replacement. However, the transition to LED technology brought significant changes. While LEDs offer superior energy efficiency and longevity, they are often integrated into fixtures in ways that make repair difficult or impossible. Many early LED luminaires were sealed units, with no practical way to replace faulty components without replacing the entire fixture.

This shift created a paradox: while LED lighting was marketed as a sustainable solution due to its energy savings, the lack of repairability led to increased electronic waste. As a response, the industry began exploring modular design and standardized components to enable repairs. The growing emphasis on circular economy principles further accelerated this trend, pushing manufacturers to rethink product life cycles beyond simple energy efficiency.

www.linkedin.com/Litecert

Legal Context and Regulatory Developments

Right to Repair Directive and Its Impact on Lighting

The "Right to Repair" directive (EU) 2024/1799 [1] focuses on consumer products, defining consumers as individuals purchasing for non-commercial purposes. Consequently, most professional lighting products fall outside the directive's scope. Furthermore, the directive only mandates repairability for specific product categories, such as washing machines and refrigerators, with luminaires notably absent from the list.

However, other regulations indicate that repairability in lighting may become more relevant. The Single Lighting Regulation (SLR) (EU) 2019/2020 [2] already mandates that light sources and separate control gear must be replaceable using common tools, unless technical justifications are provided. Additionally, manufacturers must provide information on replaceability via online platforms and product packaging.

Ecodesign Regulation and the Digital Product Passport

The Ecodesign Regulation (EU) 2024/1781 [3] introduces the Digital Product Passport, requiring transparency about repairability, reusability, and re-manufacturability. While luminaires are not yet explicitly included, upcoming revisions to the SLR are expected to integrate these requirements. Future regulatory developments may require lighting manufacturers to disclose product life cycle information, further encouraging design for repairability.

The Economic and Environmental Case for Repairability

Even though no explicit legal requirement currently exists for lighting products, manufacturers and purchasers should still consider repairability due to its economic and environmental benefits:

- Cost Efficiency: While repairing a consumer-grade luminaire priced at €20 may not be economically viable, higher-priced professional luminaires justify repair efforts. Additionally, modular design can reduce long-term maintenance costs.
- Extended Product Lifespan: Repairable and upgradable luminaires reduce material waste and carbon footprints by minimizing the need for full replacements.
- Refurbishment Opportunities: Products with high repairability scores are also easier to refurbish, allowing organizations to extend their investment in lighting infrastructure.
- Circular Economy Alignment: As more businesses adopt circular economy principles, designing for repairability enhances competitiveness and future-proof products against regulatory changes.
- Reduction of Electronic Waste: The lighting industry is a significant contributor to electronic waste. By making products repairable, manufacturers can reduce landfill waste and minimize resource extraction for new components.

The New Dutch Standard for Repairability Assessment

To support municipalities and organizations seeking more repairable luminaires, a structured assessment method has been developed based on EN 45554 [4]. This framework evaluates the ease of repair and component replaceability, ultimately providing a repairability score. The key elements of the methodology include:

1. Component Classification

Each luminaire component is classified based on its failure risk (**Figure 1**):

- High risk: Drivers, sensors, controllers, surge protectors, and densely packed electronics.
- Medium risk: LED modules, sealing elements, external sensor connectors, and low-density electronics.
- Low risk: Housing parts, wiring, and mechanical structures.

The different risk classes have different requirements for the availability of the parts. For example, high-risk parts require interoperable alternative components and long-term availability of spare parts to achieve a high score. For low-risk parts like wiring, these factors are less critical—defects are rare.

2. Parts Availability Assessment

Manufacturers must consider:

- Time: Length of spare part availability from manufacturer or supplier.
- Alternative Parts: Are alternative parts available? Which ones can serve as a proper replacement? Are these components based on open standards or proprietary standards?
- Documentation: What information is provided to support repairs? Does the documentation contain the necessary details to effectively select and implement a replacement component?

To evaluate the product, the interoperability model was used (**Figure 2**). This model shows the interfaces that need to be evaluated for determining interoperability.

	M	E	T	P	C
Interoperable	✓	✓	✓	✓	✓
Functional Interchangeable	✗	✓	✓	✓	✗
Interchangeable	✗	✓	✓	✗	✗
Physical Interchangeable	✓	✗	✗	✗	✗

Figure 2: Interoperability model. M-Mechanical, E-Electrical, T-Thermal, P-Photometric, C-Communication.

Let's have a closer look at the different elements:

Mechanical: This interface determines if an alternative component fits in the available space and can be securely mounted. The size must be correct or at least not larger than the original component, and mounting holes must be available so that no modifications are required for installation.

Low risk	Medium risk	High risk
Housing	LED module	Driver
Translucent cover	Sealings	Sensors/Controlers
Terminalblock and wiring	Connectors for external sensors and controlers	Surge protectors
	Electronics low density	Electronics high density

Figure 1: Model of Risk classification of parts.

Electrical: This interface covers functional parameters such as drive current, maximum and minimum voltage, dimming range, power supply etc. In addition to these electrical specifications, safety aspects—like the requirement for SELV power supplies, proper insulation class, and protective qualities—must be met by the alternative component.

Thermal: The thermal interface concerns the component's ability to operate in the same environment while dissipating its own generated heat. Overheating can lead to safety issues, making proper thermal management crucial.

Photometric: For lighting applications, especially in scenarios like street lighting, the photometric interface must ensure that the alternative component maintains the desired light distribution and quality.

Communication: The communication interface evaluates the protocols used between components. It is essential to use open standards to facilitate the use of alternative components. (See the separate section on Interfaces for more details.)

Only when all interfaces from the model are addressed does an alternative component qualify as fully interoperable. Additionally, manufacturer instructions must detail the necessary settings to configure an alternative, ensuring proper functionality.

To illustrate how these interfaces are addressed in practice, consider the luminaire's driver. For the mechanical interface, selecting a driver size and hole pattern that adheres to an open standard, such as Zhaga Book 13 [5], ensures compatibility with various luminaires. The electrical interface necessitates clear specifications for drive current, voltage, and other relevant parameters. Similarly, the thermal interface requires detailed thermal performance specifications. While the photometric interface is not applicable to drivers, the communication interface can be standardized using D4i, an open protocol that facilitates interoperability and achieves the highest classification for repairability.

For LED modules, achieving interoperability presents greater challenges. While Zhaga [5] standards offer numerous possibilities, the photometric interface, in particular, can be complex. Ensuring consistent light distribution and quality across different LED module replacements requires precise specifications and adherence to standards. This highlights the ongoing work needed by organizations like Zhaga [5] and other standards bodies to further refine and expand interoperability standards for LED modules.

3. Interfaces (Software & Firmware)

Interfaces play a critical role in modern luminaires. The methodology evaluates:

- Use of open vs. proprietary software.
- Programming accessibility (using general-purpose tools vs. manufacturer-specific solutions).

Zhaga and DALI [5] organizations actively contribute to open standards, ensuring future interoperability and ease of maintenance.

In the model shown in **Figure 3**, the interfaces are defined as the connections between the different parts and how they communicate. The BRL Repairability framework only considers interfaces that are luminaire-specific. For example, a luminaire with a driver, sensor, and controller involves two interfaces. However, if the controller also communicates with a central system, that additional interface is considered.

In a Zhaga Book 18 [5] luminaire, there might be a controller on top and a sensor on the underside, where the module and controller are not part of the luminaire. Here, only the interface communicating with these items is evaluated. For a Zhaga-certified [5] luminaire, the D4i open standard applies; however, in that case, Interface 1 is omitted because its evaluation is performed at the controller level, which is outside the luminaire. Interface 4, representing the communication between the programming tool and the driver, is also considered. Numerous standards are available for these purposes, and promoting open standards is essential for enhancing repairability.

4. Repairability Scoring System

A luminaire receives a score ranging from A (beyond state-of-the-art repairability) to E (not repairable). The scoring system is structured around three key criteria:

- Ability to Repair: This measures how easily the luminaire can be accessed and its components exchanged. It considers factors such as ease of disassembly, the need for specialized tools, and overall serviceability. In particular, the standard evaluates accessibility by grading how the product is opened for repair:
  - Toolless Access: Products that can be opened without any tools receive the highest accessibility rating.
  - General-Purpose Tools: A high score is also possible if only one commonly available tool is required.
  - Multiple Tools: Products requiring several general-purpose tools receive a moderate score.
  - Specialized/Proprietary Tools: If access is only possible using specialized

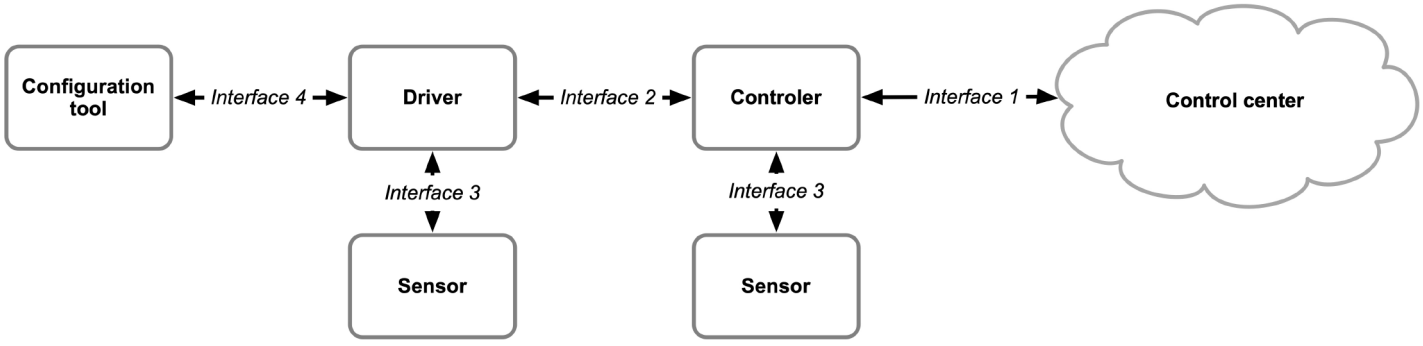


Figure 3: Model of interfaces.

or manufacturer-specific tools, the score is lower.
  - Sealed-for-Life: Products that are sealed and not designed to be opened score the lowest in this category.
- Availability of Parts: This criterion differentiates between electrical and mechanical components. It evaluates the duration for which spare parts will be supplied, the availability of alternative parts based on open or proprietary standards.
- Software and Firmware Considerations: Given the role of digital interfaces in modern luminaires, this factor assesses the openness and accessibility of the software or firmware. It examines whether programming can be performed using general-purpose tools or if manufacturer-specific solutions are required and in how far interfaces are plug and play.

Unlike other rating systems that culminate in a single aggregate score, this framework offers a detailed breakdown. Such granularity allows professional buyers to prioritize the specific criteria that matter most to their applications.

As illustrated in the **Figure 4**, the scoring is communicated through clear labeling. Although this labeling might not appear directly on products, it is extremely useful in documentation by providing a concise, one-overview snapshot of a product's repairability.

It is important to note that the BRL repairability score is based solely on the product and its inherent ease of repair. Time was deliberately excluded as a factor because it is a highly complex and application-dependent variable.

For example, the repair dynamics of a desk luminaire differ significantly from those of a streetlighting luminaire. Moreover, different organizations have varied repair practices: some municipalities require luminaires to be repairable on the spot, while others prefer to transport the luminaire back to a workshop, repair it, and then keep it in stock for future use when another unit becomes defective.

Given the significant variability in end-user requirements and application-specific circumstances, these time-dependent considerations have been intentionally omitted from the standard.

The standard also includes basic evaluation reports. While certification by an external organization is not mandatory, it must be acknowledged that interpretation can be challenging. The underlying concepts, though general, are not always straightforward.

For instance, a luminaire equipped with an "exchangeable unit"—a component that can be easily replaced—still requires evaluation of that unit. If a driver compartment, containing the driver and additional electronics, is replaced as a whole but then discarded as a single unit, the repairability benefit is lost.

Therefore, the standard mandates that such sub-assemblies must also be evaluated using the same methodology, albeit with some adjusted requirements. This ensures that every component is scrutinized to truly enhance repairability throughout the product lifecycle.

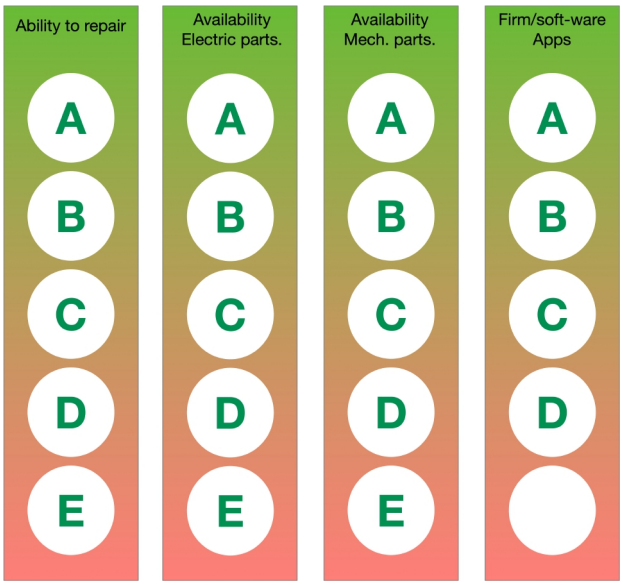


Figure 4: Scoring system.

Case Studies and Industry Trends

Several trends illustrate the growing importance of repairability in the lighting industry:

- **Refurbishment Programs:** Organizations increasingly opt to refurbish lighting rather than replacing entire systems. For example, several municipalities have implemented programs to refurbish or retrofit existing luminaires with LED solutions rather than replacing entire systems.
- **Modular Design Adoption:** Manufacturers are developing modular products that not only reduce costs but also enhance repairability as a natural byproduct. I.e. round robin tests have demonstrated that many manufacturers have already created modular solutions. While repairability was not always the initial goal, these developments represent a significant step forward.
- **Light as a Service (LaaS):** In subscription-based lighting models, repairability is crucial for reducing operational costs and improving service value. For example, LaaS has led to design choices such as external drivers to facilitate quick and easy replacements in case of failures.
- **Public Procurement Policies:** Some municipalities now incorporate repairability criteria into tenders, encouraging manufacturers to enhance their repairability scores. I.e. Several municipalities have announced their intention to include repairability requirements in tenders, pushing manufacturers to improve their designs.
- **Independent Repair Networks:** A growing market of third-party repair specialists is emerging, further driving the trend towards refurbishing and extending product lifecycles.

Practical Steps for Implementation

Manufacturers and municipalities can take the following steps to enhance repairability:

- **Incorporate repairability principles in product design** by using modular components and non-proprietary interfaces.
- **Develop clear repair guides and training programs** to empower maintenance teams and third-party repair specialists.

- **Enhance supply chain resilience** by ensuring the availability of replacement parts over extended periods.
- **Collaborate with regulators and standardization bodies** to help shape future repairability policies in the lighting sector.
- **Develop clear repair guides and training programs** to empower maintenance teams and third-party repair specialists, and ensure that all personal performing evaluations are properly trained.

Tool Accessibility: Verify that the required tools for repairs are commonly available and that any specialized tools are provided when needed. The standard includes a list of generally available tools, as outlined in EN 45554 [4], to help guarantee that repair processes are efficient and accessible.

Pro's and Con's of the Standard

Pro's

The advantages of this standard have been extensively covered in this article. The methodology promotes transparency, ensures interoperability, and provides a structured approach to assessing repairability, making it easier for municipalities and manufacturers to adopt sustainable practices.

Con's

- **Information Sensitivity:** Repairability requires access to critical product information. However, manufacturers may be hesitant to share details that could benefit competitors. While this standard addresses some concerns, information-sharing remains a potential barrier.
- **Maintenance of Replacement Parts Lists:** Keeping repairability data up to date is an ongoing challenge. For instance, if a manufacturer provides a list of compatible replacement drivers, this list must be regularly updated as components become obsolete. A structured process for maintaining this information is essential.
- **Technological Evolution:** As lighting technology advances, repairability criteria must evolve to keep pace with new innovations and industry standards.

Despite these challenges, small and simple steps can already make a significant difference in moving towards a more sustainable lighting industry.

Conclusion: Preparing for the Future

While regulatory requirements for lighting repairability remain limited today, market forces and emerging standards point toward a more sustainable, repairable, and modular lighting industry. The Dutch repairability standard provides a structured approach for manufacturers, municipalities, and buyers to assess and improve repairability—offering clear insights through detailed evaluation reports and scoring systems.

However, it is important to recognize that the concepts underlying this standard are complex. Evaluating a product based on these criteria demands a significant level of technical understanding, which can be challenging for inexperienced or non-technical personnel. Without adequate training and clear guidance, inaccurate repairability evaluations risk undermining the benefits of adopting repairable design.

To address these challenges, it is crucial that manufacturers and evaluators invest in comprehensive documentation and training programs. These resources will help ensure that all stakeholders—from design engineers to procurement specialists—fully understand the methodology behind the scoring system and can make informed decisions that promote long-term sustainability and cost efficiency.

Ultimately, investing in repairable design benefits both businesses and the environment, positioning companies ahead of future regulatory changes and aligning with global sustainability goals. As the industry transitions toward circular economy models, embracing repairability is not merely an option—it is a strategic necessity that requires technical expertise, robust standards, and a commitment to continuous learning. ■

References

[1] Directive (EU) 2024/1799 – European Right to Repair Directive.
[2] Single Lighting Regulation (EU) 2019/2020 – Ecodesign requirements for light sources and separate control gear.
[3] Ecodesign Regulation (EU) 2024/1781 – Introduction of the Digital Product Passport.
[4] EN 45554 – Standard on the assessment of the repairability of energy-related products.
[5] Zhaga Consortium & DALI Alliance – Organizations Driving Industry Standards for Component Interoperability
[6] iFix Repairability Index (France) – Scoring system for consumer product repairability.

Jaap Nuesink brings 35 years of experience in the TIC industry to his work in the lighting sector. As the author of several books and an active contributor to normalization efforts, he has continuously worked on informing and improving quality and repairability standards. His dedication to advancing sustainable practices and practical solutions in the lighting industry makes him a respected voice in the field.

Litecert - Quality and trust as the foundation for sustainable progress.

jacob@litecert.com

Litecert


30th
The most influential and comprehensive lighting and LED event in Asia
www.light.messefrankfurt.com.cn
guangzhou international
lighting exhibition
9 – 12 June 2025
China Import and Export Fair Complex, Guangzhou, China
messe frankfurt
光亚 · Guang ya

deLIGHTed Talks: Good Light – Good Sleep

Learn how light affects your sleep in presentations by Dr. Renske Lok and Dr. Jeffrey Hubbard and moderated by Dr. Virginie Gabel.

In our fast-paced, technology-driven world, where artificial light dominates our environments, the relationship between light and sleep has never been more critical. Exposure to the right type of light at the right time is essential for regulating our circadian rhythms—the internal clock that governs sleep and wakefulness. Insufficient light exposure in the morning or excessive light in the evening can disrupt sleep, impair alertness, and reduce productivity during the day. Join us as we explore how good light can optimize melatonin production, support restful nights, and enhance overall well-being.

Talk: How daytime light exposure shapes nighttime sleep quality by Dr. Renske Lok.

Light is more than just a visual stimulus—it plays a fundamental role in regulating various physiological and behavioral processes beyond vision. These non-image-forming effects include maintaining alertness, enhancing cognitive performance, and regulating melatonin production. While many people recognize the importance of light for wakefulness, its impact on sleep is often overlooked.

Sleep is fundamental to overall health and well-being, playing a critical role in immune function, cognitive performance, and emotional regulation. Our research, spanning both controlled laboratory experiments and real-world field studies, reveals that daytime light exposure has a profound impact on nighttime sleep quality. Specifically, exposure to high-intensity light during the day enhances sleep depth, minimizes nighttime awakenings, and improves overall sleep efficiency. These effects not only promote more restorative sleep but also reduce next-day sleep inertia, leading to greater alertness upon waking.

These findings have important implications for both public health and personalized sleep strategies. Given modern lifestyles, where many individuals spend the majority of their day indoors under artificial lighting, understanding how light exposure shapes sleep can help inform better lighting designs, workplace policies, and behavioral interventions to improve sleep health.

Talk: The opposing forces of light and darkness on sleep and waking behavior: Lessons from nocturnal and diurnal animals by Dr. Jeffrey Hubbard.

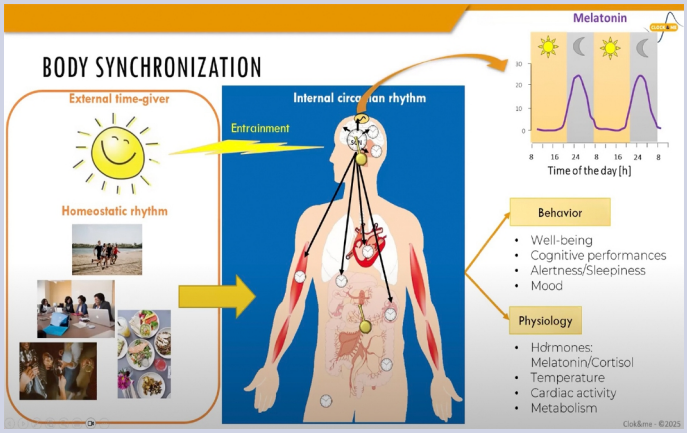
Light is a powerful regulator of sleep and wakefulness in most animals, exerting both acute and sustained effects on these behaviors. Although the influence of light exposure on circadian rhythms is well-characterized, its direct, non-circadian effects on sleep and waking have been less explored. In fundamental neuroscience, animal models allow for detailed investigations on how light and darkness impact sleep and waking using both nocturnal species, such as laboratory mice, and day-active species, such as the Sudanian grass rat, Arvicanthis ansorgei. This talk will explore how light—and darkness—modulate sleep and wakefulness through direct effects on distinct neurobiological systems and can reshape sleep/wake architecture. By comparing the effects in these two species, we can examine how the same environmental cues can produce divergent behavioral and physiological responses, depending on the temporal niche of the animal. As artificial lighting increasingly blurs the boundaries between day and night in our societies, uncovering how exposure to light shapes fundamental biological processes is crucial. By deepening our insight as to whether light can support or disrupt natural sleep in these animals, this provides context as to how we consider our living circumstances in a world that is never completely in darkness.

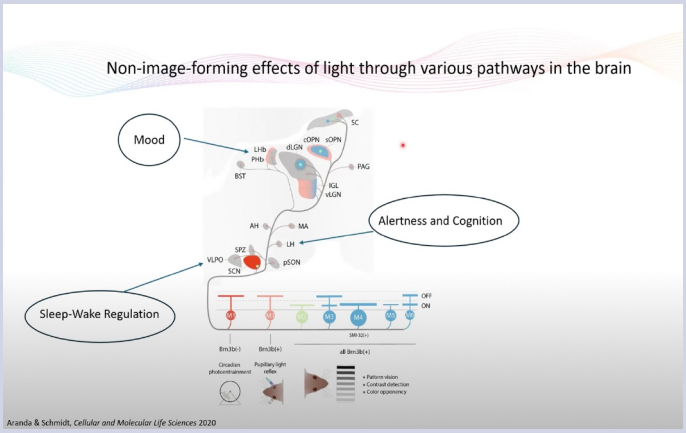
https://youtu.be/mG_Y62eea5Y

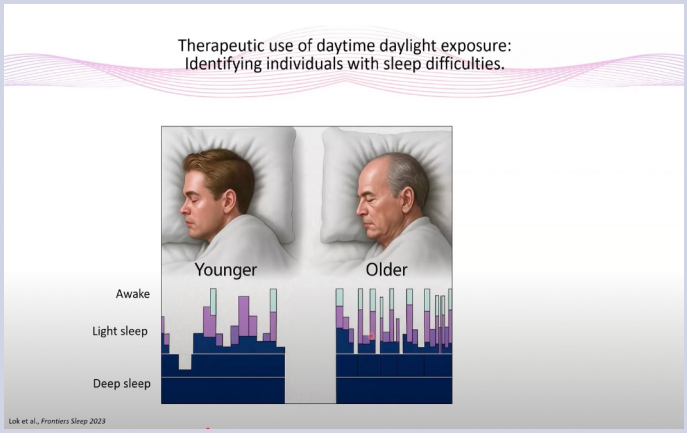
LpS Digital, supported by

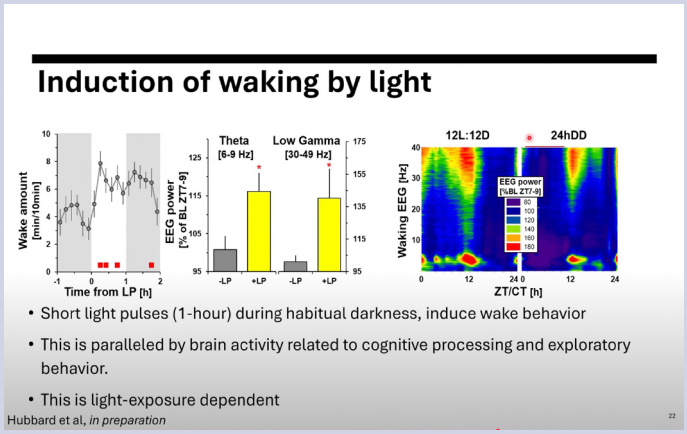
LpS DIGITAL

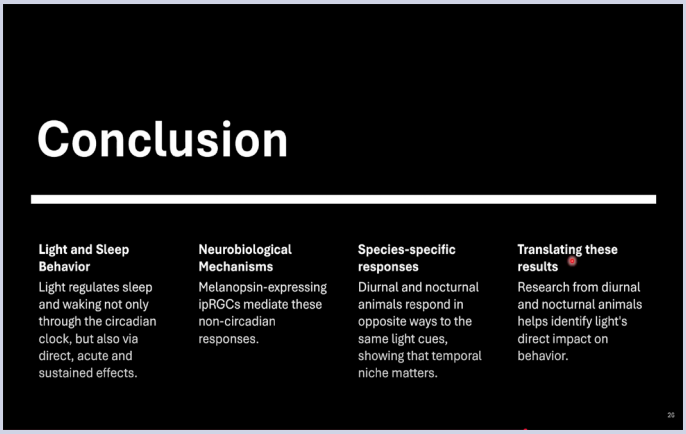
https://youtube.com/c/LpSDIGITAL











PREVIEW*
July/Aug 2025 | LpR 110

Lighting Outlook

In this issue, we take a look back at LightFair International in Las Vegas and highlight key trends and takeaways from the event. A final interview with the CIE concludes our ongoing interview series with the organization. In the second part of our feature on dynamic lighting design, we focus on the underlying technical requirements. On the technology front, we once again explore the topic of optical elements and bring you the latest reports from the international lighting community.

* *Subject to change without notice.*

DEADLINES | LpR 110

AD CLOSE
July 1, 2025

MATERIAL DUE
July 1, 2025

DIGITAL PUBLICATION
July 15, 2025

PRINT PUBLICATION
July 30, 2025

ENQUIRIES

info@lugerresearch.com

Subscribe

https://www.led-professional.com/misc/subscribe

Advertise

https://www.led-professional.com/advertise

Annual Subscriptions

LpR Digital Magazine
- eMagazine (PDF download)
- 6 Issues per Year (Bi-monthly)
- Full Archive Access (all previous eMagazine issues)
- Business Issue to share and use within organizations
- EUR 78.80

LpR Printed & Digital Magazine
- Print Magazine including shipping
- eMagazine (PDF download)
- 6 Issues per Year (Bi-monthly)
- Full Archive Access (all previous eMagazine issues)
- Shipping costs included
- EUR 97.80

Cover Page: Product Launch of the new TECTON II luminaire from Zumtobel. Image © Zumtobel.

Imprint

LED professional Review (LpR)
ISSN 1993-890X

Publishing Company
Luger Research e.U. | © 2001–2025
Institute for Innovation & Technology
Moosmahdstrasse 30, A-6850 Dornbirn, Austria, Europe
info@lugerresearch.com | www.lugerresearch.com
P +43 5572 394489 | F +43 5572 394489 90

Publisher
Siegfried Luger +43 699 1133 5570 s.luger@lugerresearch.com

Editors
Dr. Günther Sejkora +43 5572 394489 70 editors@led-professional.com

Theresa König +43 5572 394489 70 editors@led-professional.com

Elio A. Farina +43 5572 394489 70 editors@led-professional.com

Art & Design
Sarah Rauchlechner +43 680 2305 445 hallo@moments-of-aha.com

Account Manager
Christine Luger +43 699 1133 5520 c.luger@lugerresearch.com

China, Hong-Kong
Lolo Young +852 9792 2081 lolo@castintl.com

Germany, International
Armin Wezel +49 30526 891 92 armin@eurokom-media.de

India
Priyanka Rai +91 124 4787331 priyanka.rai@binarysemantics.com

South Korea
Jung-Won Suh +82 2 78 58222 sinsegi@sinsegimedia.info

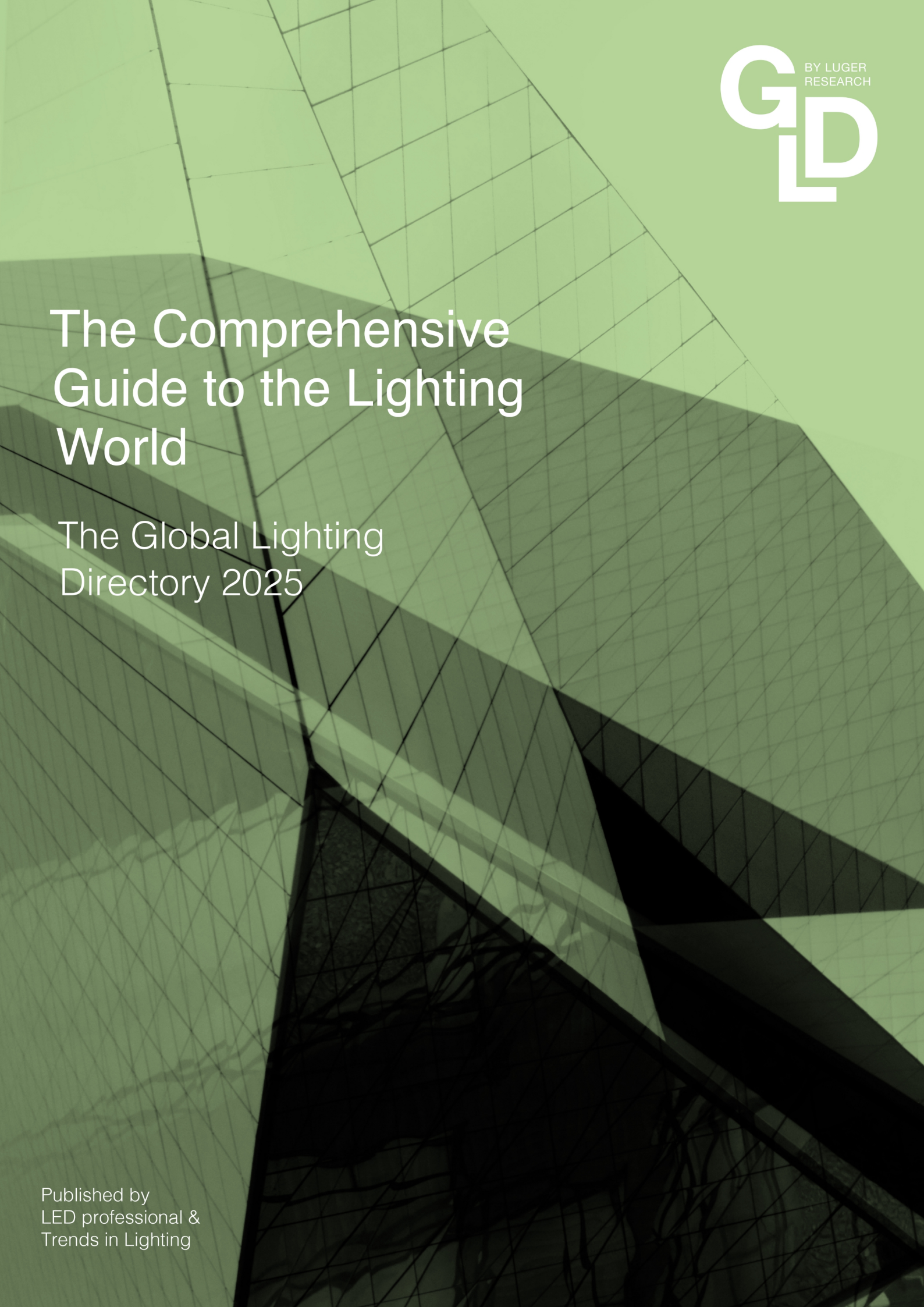
Taiwan
Leon Chen +886 2 256 81 786-10 Jeon@jkmedia.com.tw

Benelux, France, Ireland, Scandinavia, UK
Zena Coupé +44 1923 85 25 37 zena@expomedia.biz

USA & Canada
Lesley Harmoning +1 218 686 6438 lesley@lhmandco.com

Jill Thibert +1 218 280 2821 jill@lhmandco.com

Copyrights – Luger Research e.U.



BY LUGER RESEARCH

The Comprehensive Guide to the Lighting World

The Global Lighting Directory 2025

Published by
LED professional &
Trends in Lighting

Showcase in LpR #110

July/Aug 2025

Submit Your Proposal to our Editors

editors@led-professional.com
www.led-professional.com