

Lighting India

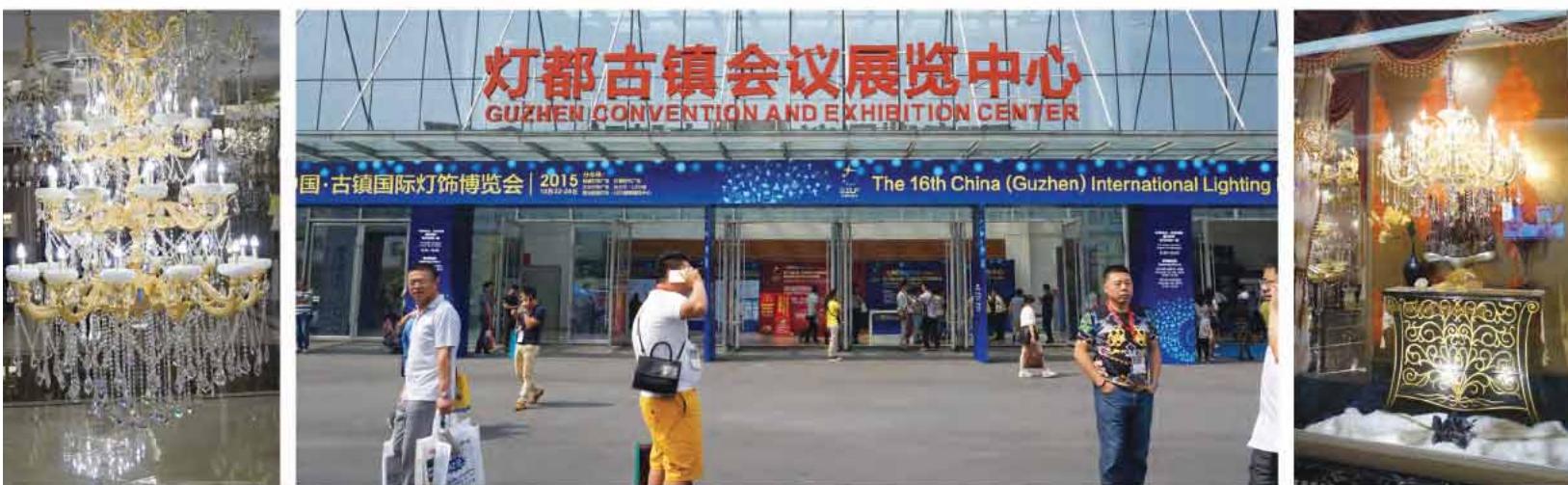
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Vol. 10 No. 6

November - December 2015



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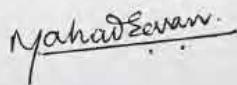
How acute is the challenge for around 400 million people in this country that was brought forward by the census report of 2011. The report said that nearly 80 million Indian households, approx. 400 million people, do not use grid electricity as the main source of lighting. Of these, almost 94% live in rural areas. Out of the 180 million rural households in the country, nearly 43% still use kerosene as the primary fuel for lighting.

According to the U.S. Energy Information Administration (EIA), approx. 61 million barrels of kerosene were consumed by Indian households and commercial establishments in 2012. Data on kerosene consumption when used with other census data (including kind of houses: pucca (concrete) vs. kuccha (earthen); percentage of cultivators, and socio-economic status of population) can provide important insights for effective market mapping. The data from all these sources were used for district selection and route planning for the van campaign during the Lighting Asia/India, Consumer Awareness Campaign. Due to the large geographical expanse of India, and to create an impact, the campaign was run in select districts of Uttar Pradesh, Bihar and Rajasthan, chosen on the basis of need for the product category, purchasing power, etc.

Mahadevan Iyer
Editor-in-Chief

As per the Census of India 2011, over 90% of households in three districts, and over 80% in thirty districts of Uttar Pradesh, use kerosene as a primary source for lighting. Good that some big lighting companies are coming forward to address this great challenge with solar lights. I hope, in 2016 many more such companies will extend their hands with their rural solar lighting projects...

Do send in your comments at miyer@charypublications.in



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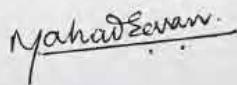
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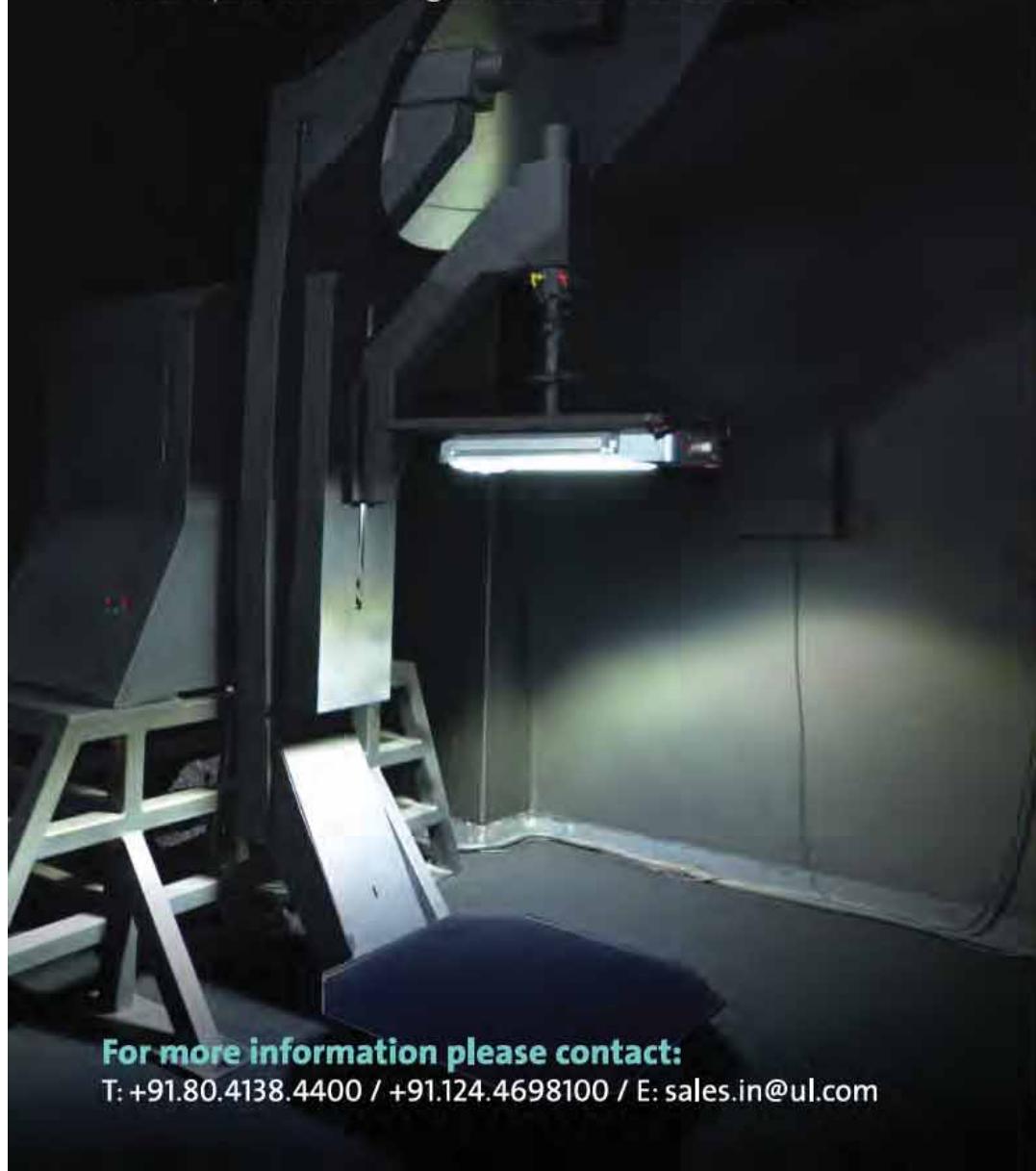
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Illuminating Ideas: Material Solutions for Lighting

The market for light-emitting diodes (LEDs) in lighting is booming. It's no surprise since it is energy efficient, environment friendly and offers a long service life. With the growing demand for unique designs and creative ideas, designers and manufacturers of LED lighting components can choose from a wide range of innovative solutions offered by Covestro. In addition to high light transmission, our polycarbonate grades display good heat resistance, excellent stability when exposed to LED luminous flux, outstanding flame-retardant properties, and a number of special features that are ideal for a wide range of LED applications.

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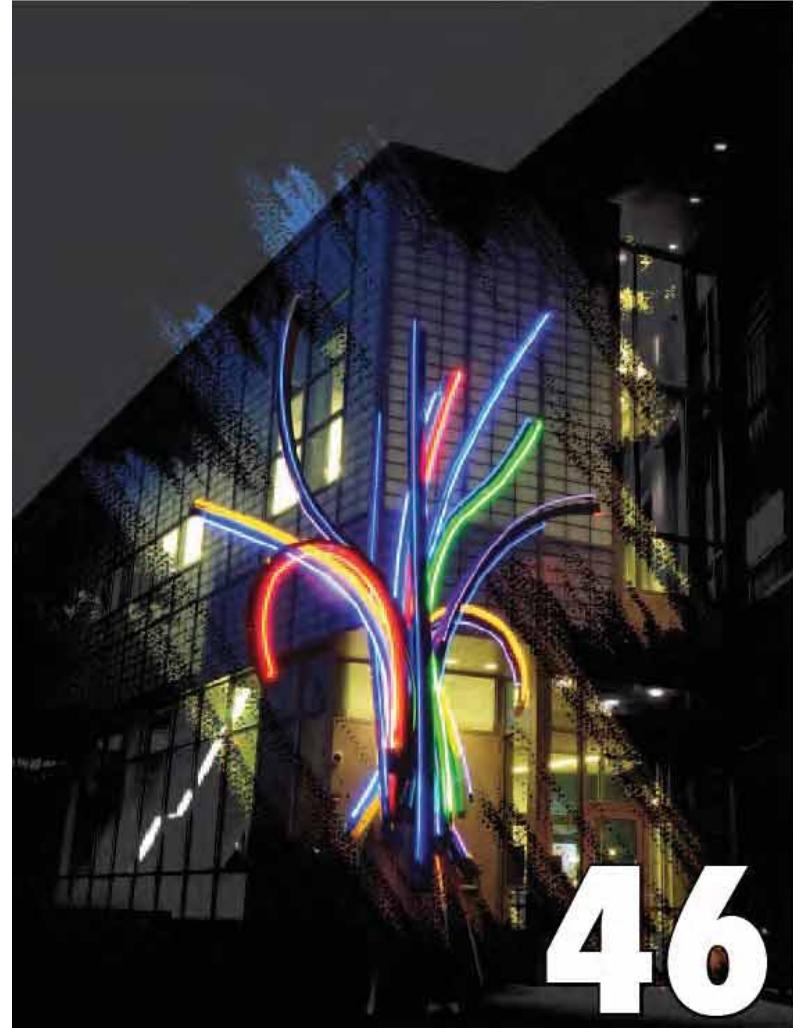
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EDITORIAL



Towards A New Era

When any new technology reaches a reasonably acceptable stage of maturity, it inducts the usable excellences from the other contemporary technology fields, that way it further enriches itself and enhances its usability, flexibility, scalability, reliability, safety and environment-friendliness – to be more sustainable.

Exactly the same thing is now happening in the field of lighting in a very overt way, where hardware has reached a stage that can be made more user-friendly with infusion of Information Technology (IT). Although the phenomenon is not new as we have been witnessing the deployment of IT in the lighting control systems for more or less one decade, the significance lies in the fact that now with the versatile efficiency of the information technology – and development of high quality sensors, it is not just limited to the control of the lighting systems – it is optimisation of the lighting systems that includes a much wider gamut.

From this perspective, when I see that together Philips and Cisco aim to accelerate adoption of Internet of Things (IoT) technology in the lighting market and deliver increased connectivity, comfort and efficiency, constituting the most innovative features of a modern building, I sense the outset of a new era – and visualise an altogether renovated world with colours floating around without harmful chemicals and moods being elevated without waste of expensive resources.

Please e-mail me your views at pkchatterjee@charypublications.in

P K Chatterjee (PK)



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Editor-in-Chief: Mahadevan Iyer

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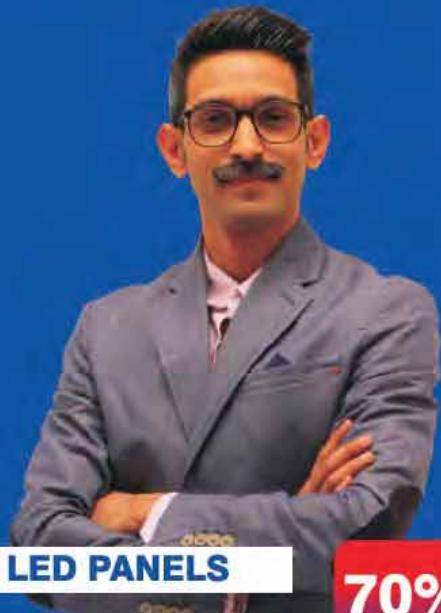
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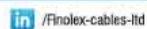
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Mindteck's Vice President demonstrates their Smart Street Lighting Solution



Yusuf Lanewala
Chairman & Managing Director, Mindteck

Mindteck (India) Limited; a global technology company that provides Product Engineering solutions and IT services to top-tier Fortune 50-1000 companies, start-ups, leading universities and government entities worldwide; showcased its Smart Street Lighting Solution at Bangalore ITE.biz 2015, Karnataka's premier IT summit. The event was organised by the Government of Karnataka's Department of IT, Biotechnology and Science & Technology, along with STPI-Bangalore.

At the summit, Mindteck participated in the Smart City Solution Workshop organised by NASSCOM in partnership with the Government of Karnataka. It was attended by municipal commissioners of the shortlisted cities in Karnataka, senior members from urban local bodies, development authority officials, the Principal Secretaries of Urban Development and IT- Government of Karnataka, and other senior government officials.

Dr. KV Krishnan, Mindteck's Vice President-IT Services, presented an overview of the company's smart city solutions, and its Smart Street Lighting implementation for a United Kingdom-based utility company that has resulted in record reductions in energy consumption and CO₂ emissions.

"This solution has seen a tremendous success, in that energy consumption has been significantly reduced from 50 to 34m kWh. We hope to replicate similar energy efficiencies across India," commented Yusuf Lanewala, Chairman and Managing Director, Mindteck. ■

Philips provides solar street lighting in Uttar Pradesh, Manipur



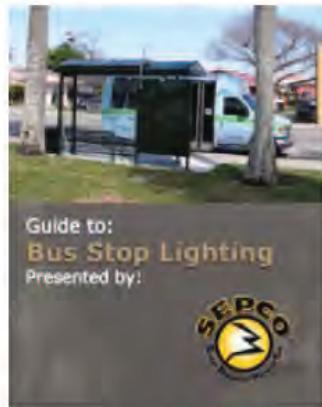
India has today close to 300 million people who have no access to electricity...

testimony to Philips' R&D capabilities and undisputed product quality. We hope that by the end of this project, solar LED lighting can be recognised and applied more widely to help eradicate light poverty. Such model projects go a long way in raising awareness of the power of lighting technologies in solving global challenges in energy, education, agriculture, public infrastructure and health."

Through the installations, NEDA, the nodal agency of Uttar Pradesh is required to light up the villages in two phases under Dr. Ram Manohar Lohiya Samagra Gram and Janeswar Mishra Gram Yojana, a government funded scheme monitored by the Chief Minister of Uttar Pradesh.

India has today close to 300 million people who have no access to electricity, and they have to depend on wood fire or kerosene for their lighting needs. Through solutions such as solar lighting, we believe that we will be able to bring far less expensive, healthier and environmentally friendly lighting to this large population. This solar mission driven jointly by the government and the private sector can really help in taking the Prakash Path initiative to all of rural India - where electricity is unavailable or erratic," adds Chitale. ■

Solar lighting power company SEPCO offers a guide to bus stop lighting



The cover page of SEPCO's guide...

Do you have a bus stop lighting project? Are you considering using solar as a green alternative? Then you can get complete guidance from downloading a free e-book.

SEPCO, the well known manufacturer of commercial solar lighting and remote solar power systems provides this e-book, which can be downloaded from www.sepcosolarlighting.com/solar-bus-stop-lighting after login.

This guide includes: Why to implement bus stop lighting; Where to implement bus stop lighting; How to implement bus stop lighting; Benefits of using solar bus stop lighting and so on. The e-book will help you make an informed decision on all aspects of bus stop and shelter lighting for transit systems, municipalities, cities and other areas.

Solar lighting has many excellent qualities. It is a green alternative to the traditional lighting. It is a low cost and almost maintenance-free option. ■

Open a new frontier in LED lighting.



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Everlight rolls out ultra-high efficiency series

EVERLIGHT



5630 KK5D Series 0.2W

5630KK5D series is optimised to obtain the industry's highest optical efficiency...

Everlight has launched several ultra-high efficiency series this year (2015) in response to the rigorous demands in the market for illumination efficiency. Among all, the 5630KK5D series provides the best performance. Using plastic materials with high reflection/lifetime and an improved optical structures, the company's 5630KK5D series is optimised to obtain the industry's highest optical efficiency of 200 lm/W (5000K).

This fits the demands of commercial light tubes for extremely high illumination, and makes the entire fixture more energy efficient. The COB series features a complete array of wattage (2-50W), high performance and flexibility for installation.

M08 (1204) and M09 (1208) series are designed with highly thermal conductive aluminium-coated substrate for effective heat dissipation and keeping the lighting fixture stable. All EVERLIGHT's COBs have to go through the LM80 lumen maintenance test – and are provided with accessories such as standardised holders, appropriate reflectors and more is available in the aftermarket.

This year EVERLIGHT made a breakthrough in the special application of horticulture lighting.

Along the entire spectrum of lights absorbed by plants, the wavelengths of 430nm, 660nm and 730nm provide the most satisfying effects for the growth of plants' roots, stems and leaves. According to the company, they are the first in the industry to incorporate 0.2W / 0.5W 2835 and 1W ceramics 3535 in one single package for the three wavelengths mentioned above. ■

Cadenzza installs brilliant display lighting at its store



The front view of Cadenzza's shop...

Customers of Cadenzza, the multi-brand jewellery store, enjoy personal service and an inspiring environment where they can always find something special. An essential part of this experience is the exclusive store design, as exemplified by the Düsseldorf branch of Cadenzza. Displays

brilliantly backlit by LED modules from Tridonic are an important element of this look.

Since 2012, the Cadenzza brand, a part of the Swarovski group, has been offering luxury hand-picked jewellery from world-famous names and emerging fashion designers – a collection that has been put together with a keen eye on the latest trends and that ranges in style from understated elegance to edgy fashion statements. There are plans to create an international sales network by 2020, and already there are stores throughout Europe and in the Middle East and Asia.

The new store concept for Cadenzza was created by Hamburg architects Anders+Grabmeister. The stores feature central and wall-mounted displays with elegant white and brown tones as the unifying colour scheme.

The highlight is the luxury fashion brand wall where items from the elite brands are displayed with backlit logos.

Despite their large dimensions, the light boxes with photos from the latest Cadenzza campaign have impressively low profiles. With a depth of only 45 mm for the door visual and 70 mm for the cash desk visual, the displays can be integrated perfectly in the store concept. The smaller model is recessed in one of the presentation cases, whereas the larger one is designed as a wall panel. ■

Suede uses Avolites Tiger Touch II controls for cinematic lighting



Avolites' exclusive Netherlands distributor Fairlight supplied the Tiger Touch II...

Lighting designer Jip Nipius controlled the lighting for a special 'cinematic' two-part show by English rockers Suede at London's Roundhouse in November using an Avolites Tiger Touch II for the first time. Nipius has been working with Suede since the late 1990s, and was asked to create a lighting design to complement the band's 'experiential' new shows, which were

performed to launch a brand new concept album and short film.

For the first half of the show, lead singer Brett Anderson and his bandmates performed behind a partially transparent screen, onto which their movie – a 'dark and dramatic tale of love and despair' – was projected. For the second half, the screen was pulled up to reveal the performing group as they played a selection of the now legendary Suede classics.

Avolites' exclusive Netherlands distributor Fairlight supplied the Tiger Touch II to Keylight's Gary Yates after inviting him and Nipius for a demo of the console at his Bemmel studios.

"I was immediately impressed with the Tiger Touch II's generous 20 faders, 10 macros and large, bright screen, which meant I didn't have to take an expansion wing with me and I could take the entire console to London as check in luggage! The console was just what I was looking for, control wise - the touch screen handles nicely and is very responsive. Graphically, it's great, with the premade gobo and position pictograms," says Nipius. ■



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Philips and Cisco form global strategic alliance



Philips and Cisco have made a global strategic alliance that will create new value in energy savings, building efficiency and employee productivity, made possible by the Internet of Things (IoT) in modern offices. This alliance brings together Philips' LED based connected lighting system with Cisco's IT network to address a global office market estimated to be worth EUR 1 billion.

Lighting is everywhere, making it one of the easiest ways to bring the Internet of Things (IoT) to office buildings. Light points in the Philips system, equipped with sensors and software applications can be connected using Cisco technologies. This lighting network creates a pathway for information and helps enable new services.

The global alliance in the Internet of Things will help enable customers to receive the best that the lighting and IT industries have to offer. Philips and Cisco will also collaborate on a joint go-to-market strategy.

Bill Bien, SVP, Head of Strategy and Marketing, at Philips Lighting, said, "Our alliance has two of the world's biggest and trusted lighting and connectivity brands working together to bring the Internet of Things to life in offices and commercial buildings across the world. Customers will receive the best energy efficient lighting experience in the connected world and be able to use information acquired from their connected lighting system to save energy, reduce costs, improve productivity and optimise their workspace environment. Lighting that is connected to highly secure, reliable IT infrastructure will form the backbone of the smart office of the future."

Ecosense Lighting acquires Journée Lighting



Image Courtesy: Ecosense Lighting

A view of the Hedonism Wines shop, located at London, England, designed by Speirs + Major, interior designed by Universal Design Studio, products used: EcoSpec Linear HP INT Wall Wash, supplied by Architainment Lighting... The project received Gold, Illumni Infinity Award 2013...

including significant patents ranging from component-level to system-level solutions. This acquisition allows EcoSense to enter the downlight and track lighting market and leverage Journée's IP for future product development efforts.

"Journée's specifier-grade product portfolio is a great complement to our brand. Further, their significant IP portfolio will enable us to expand our product offering in interesting ways," says Mark Reynoso, CEO of Eco Sense Lighting.

"We are thrilled to partner with Eco Sense and leverage their key strengths, including new technology development, manufacturing efficiencies and global sales expertise," says Clayton Alexander, CEO of Journée Lighting.

Cree helps Thermo Fisher Scientific reduce energy cost



Some of the Cree products used in the project...

After years of searching for the right partner to help implement LED lighting across its Asheville, N.C. campus, Thermo Fisher Scientific, the world leader in serving science, chose Cree, Inc., to provide a turnkey solution to achieve the rigorous operational requirements and energy returns necessary to make the switch from traditional lighting possible.

The LED luminaires installed across the facility are already generating positive results, delivering an anticipated three-year payback with a 1.1M KWH power reduction and savings of up to 40% annually. Powered by Cree TrueWhite Technology, the newly installed LED lighting system delivers the industry's best colour quality, creating more functional and better-lit environments for Thermo Fisher staff, while significantly reducing the facility's operational expenses and energy output, compared to obsolete lighting technologies.

"We evaluated LED lighting for years but could not find the right partner to provide the payback necessary to help us make the switch. Our customers want sustainable solutions, and projects like this allow us to reduce our energy consumption while achieving high quality productivity gains. Overcoming the financial hurdles of switching to LED within the required timeframe would not have been possible without the end-to-end approach and product innovation made available through Cree Solutions," said Scott Self, Global Energy Director, Thermo Fisher.

"Cree is dedicated to offering easy access to better quality light that helps customers save without settling," said Betty Noonan, Cree Chief Marketing Officer.

Crestron is Lighting Control

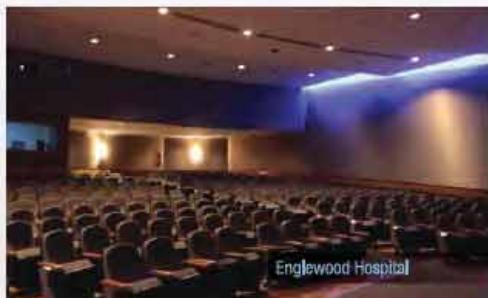
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Chris Pfistner joins as a Vice President in Lumentum



Chris Pfistner

"I am excited to join Lumentum. I welcome the opportunity to work with strong internal teams ..."

According to a communiqué from Lumentum Holdings Inc. (Lumentum), Chris Pfistner has been appointed in the company as a Vice President, Product Line Management, Datacom products. Pfistner will focus on the Datacom market, and ensure that the current and future Lumentum products deliver a compelling value proposition. This is a new position, and Pfistner will report to Alan Lowe, Lumentum's President and CEO. "Chris brings exceptional experience and additional depth to my staff as we implement initiatives to fully realise our Datacom revenue and marketing goals. I look forward to working with Chris to move the company to the next level," said Lowe.

Pfistner has over 20 years of marketing, product definition, and senior leadership experience. Most recently, he was the Sr Director, Marketing at Finisar. Before that, he was the VP of Product Marketing at Neo Photonics. Prior to that he held various Sr Marketing, Sales & PLM positions with Terawave, AFC and Pirelli. He got his PhD in Applied Physics (Lasers) as well as his MSEE from the University of Berne, Switzerland.

"I'm excited to join Lumentum. I share Alan's vision for Lumentum, and I welcome the opportunity to work with strong internal teams to define winning products and to capitalise on the rapidly expanding Datacom transceiver market," said Pfistner. ■

NAESCO's Affiliate Advisory Committee gets new Chair



Rhonda Courtney

"I am absolutely honoured to have the opportunity to participate in such an important initiative..."

Rhonda Courtney, Business Development Director at Energy Focus, Inc., a company well known for LED lighting technologies, has been appointed as the Chair of (US) National Association of Energy Service Companies' (NAESCO's) Affiliate Advisory Committee.

NAESCO, the country's foremost leading energy efficiency organisation, serves as the voice of the Energy Services Companies (ESCO) industry, supporting the efforts of its members through national and regional advocacy efforts. The association has been a key catalyst in creating, among federal and state lawmakers,

regulators and energy programme managers, a continuing commitment to developing and implementing energy efficient solutions for over 30 years. The newly formed Affiliate Advisory Committee was created to drive critical support to all affiliate members – and enhance educational efforts around evolving new energy efficient technologies, financing and development of comprehensive efficiency projects.

"I am absolutely honoured to have the opportunity to participate in such an important initiative that advances the essential contributions of NAESCO," said Courtney. ■

Licitra takes over as the Executive VP of IES, North America



Timothy Licitra

"I'm excited to join the IES team and look forward to the tremendous things that they will do..."

The Illuminating Engineering Society of North America (IES) has inducted Timothy (Tim) Licitra as Executive VP, effective from October 19, 2015. Licitra is responsible for the overall management of IES, implementing organisational strategy, leading IES staff and volunteers, managing operational priorities and programmes, and developing and implementing IES' relevant plans and policies, all designed to meet the needs of the society's members.

Licitra earned a BSc in Marketing from the University of Rhode Island and holds an MBA with

a concentration in Marketing from Rutgers – The State University of New Jersey.

"I am excited to join the IES team and look forward to the tremendous things that our leaders, volunteers and staff will do to enhance the profession and serve our members in the months and years ahead. I look forward to engaging with our members, volunteer leaders, staff, and partners as IES enters its 110th year of serving the lighting industry. With our leadership team, we will work to ensure that IES remains an indispensable part of our members' success," said Licitra. ■

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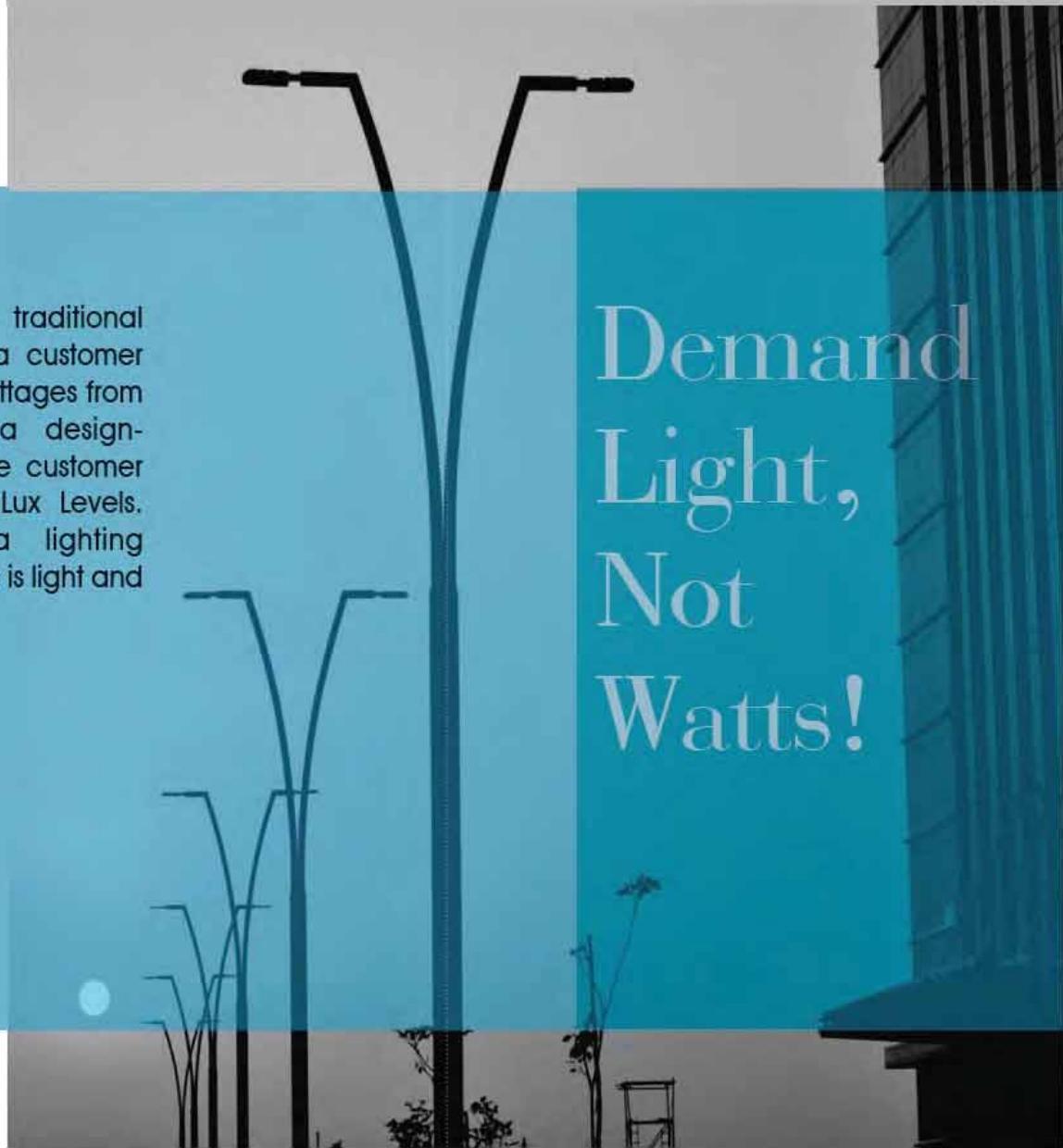
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LED Street Lighting

A Design Based Approach For Maximum Light Efficiency And Energy Saving

As opposed to the traditional approach, wherein a customer demands specific wattages from manufacturers, in a design-based approach, the customer demands light i.e., Lux Levels. Eventually, from a lighting product, what matters is light and not watts...

Demand
Light,
Not
Watts!



LED

Lighting is changing the landscape of outdoor lighting and today, outdoor lighting plays a crucial role in the safety and security of our streets and public places. Thus, Street lighting has to be smarter to comply with new legislation, environmental challenges and requirements to reduce energy usage.

The LED market in India has been growing at a rate of over 50% for the last five years (2009-10 to 2013-14) and is expected to sustain this growth rate in the next five years (2014-15 to 2018-19).

The Government of India has announced a lot of incentives and measures in order to prioritise the use of LEDs in the country. It is clear that the Street lighting application leads India's LED lighting market, due to various state governments' initiatives to replace conventional sodium lights with LED lights.

This article on LED Street Lighting endeavours to demonstrate how a design based approach can be adopted to maximise both light and energy efficiency and save on the total project cost for the customer.

What is a design-based approach?

As opposed to the traditional approach, wherein a customer demands specific wattages from manufacturers, in a design-based approach, the customer demands light i.e., Lux Levels, which may be as per the National Lighting Code or customer specific and does not specify watts at all. Eventually, from a lighting product, what matters is light and not watts.

The customer provides the site details like the Pole Height, Pole Spacing, Road Width, Boom Length etc. to the manufacturer – and based on these details, manufacturer simulates designs in special lighting softwares by using their own IES files to achieve average lux level and uniformity ratio

as per National Lighting Code or IS 1944 or as demanded by the customer.

The National Lighting Code or IS1944 classifies the type of roads as given under:

Classification of Lighting Installation	Type of Road	Average Illumination on Road	Uniformity Ratio
Group A1	Important traffic routes carrying fast traffic	30	0.4
Group A2	Other main roads	15	0.4
Group B1	Secondary Roads with considerable traffic	8	0.3
Group B2	Secondary Roads with light traffic	4	0.3

Objective of the customer:

To achieve the required illumination level and uniformity ratio with least wattages (Power Consumption) and eliminating dark patches...

Thus, taking into consideration the above table and choosing the appropriate type of road, the customer floats, an RFQ based on illumination level and uniformity ratio and not on power consumption. He/she also takes into consideration the energy cost over the lifetime of LEDs and to minimise that.

Design-based approach is the most practical approach for LED Street Lighting as it takes in to consideration not only the initial investment but also the energy cost during the lifetime of LED Street Light.

Case study: Traditional approach

Let us understand the difference

Parameter	Manufacturer A	Manufacturer B	Manufacturer C
Wattage	80	80	80
System Efficacy	100	85	75
Luminous Flux	8000	6800	6000
Optics			
Advanced	Poor	No Optics	
Avg. Lux	15	10	8
Uniformity	> 0.5	0.3	0.2
Price (In Rs.)	11000	10000	9000

between two approaches.

In the old traditional approach, the customer demands specific wattages i.e. 80W LED Street Light to replace the existing 150W HPSV. The customer asks

for Quotation of 80W LED Street Light from three different sellers. He/ she has not specified any lighting levels, and so there are lot of differences in specifications of all different manufacturers as under:

If we analyse the table below, Manufacturer C offers his 80W LED Street Light at Rs. 9000/- . The customer would opt to buy the Street Light from Manufacturer C considering lowest price. However, post installation, the illumination levels and uniformity would definitely disappoint the customer.

Manufacturer A has a price of Rs. 11000/- for his 80W LED Street Light since he is offering an Avg. Lux of 15, which is almost double than that of C. The system efficacy is also 100 lm/W and uniformity ratio is also > 0.5, which is excellent. Had Manufacturer A to offer the same specifications as offered by Manufacturer C, he would

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have offered just 40W instead of 80W. This way, the customer would not only save on the initial capital investment, but also save additional energy of 40W per street light during its lifetime.

By just specifying watts, the customer is losing on an excellent quality product.

Why should you adopt a design-based approach?

As seen in the case study above, there are differences in specifications in luminaires of different manufacturers. The major differences may be in:

- Luminaire Design - Thermal Management
- Type & Efficiency of LEDs used
- Quality & efficiency of optics employed with reference to the type of road
- Driver's efficiency and quality.

Thus, these differences may lead to adoption or procurement of poor quality street lights, which would not deliver light as the customer would have originally thought of. This would disturb the very purpose of LED Street Lighting.

For the customer, what matters eventually are lux levels and the uniformity ratio obtained from least wattages. Thus, inferring from the above table, price of a street light does not depend on watts but on lux levels and uniformity ratio.

Design-based approach in LED street lighting – a case study

In this case, the customer demands an average lux of 15, Uniformity Ratio > 0.4 and provides the design details

to the manufacturer: The Pole height is 9 m, Road width is 8 m on two sides with a 1 m median in the centre, Boom Length is 1 m and the degree of tilt is 5° . The manufacturer has to design wattages.

Let us see and analyse the designs provided by three manufacturers to achieve the required illumination & uniformity ratio:

Looking at the table below, Manufacturer A provides the desired illumination and uniformity with 70W, Manufacturer B with 90W & Manufacturer C with 110W.

Manufacturer C offers highest wattages i.e., 110W. At the same time, for the customer, the initial capex if he/she opts for Manufacturer C is the lowest i.e., Rs. 10000. But if we look at the overall cost which the customer will incur over the lifetime of the Street Light, i.e., Product Cost + Energy Cost, Manufacturer A's LED Street Lighting system would be the most economical. The total savings by opting for Manufacturer A as compared to B & C is substantial and therefore the initial capex can be justified.

If we consider 100 Street Lights in the project, the customer would incur a total cost of Rs. 34.5 lacs by installing Manufacturer A's lights, Rs. 42 lacs for Manufacturer B & Rs. 49.5 lacs for Manufacturer C. Now whose lights would be the most ideal and beneficial to install? Obviously Manufacturer A's.

This is just a hypothetical example to show that even if the initial investment incurred by the customer is high, the total cost by opting for Manufacturer

A's product would be substantially low. It may also be the case that the customer would incur same capex for 70W & 110W.

The difference in wattages of all three manufacturers is on account of the type of LEDs used, adoption of optics/lenses, efficiency of driver and thermal management.

Similarly, for a completely new installation with new poles, the customer can save a lot on capital costs and energy costs by providing road dimensions to manufacturers and asking them to design the Wattages as well as Pole Spacing. With a longer pole span, the no. of poles and luminaires can be drastically reduced.

Physical verification of average lux and uniformity ratios - 9 point method measurement

Average Lux and uniformity ratio can be easily verified by installing 3 LED Street Light samples on 3 Poles in case of single side installation or 6 LED Street Light samples on 3 poles in case of a median.

Light is to be measured at 9 points as shown in the diagram (next page) with help of a simple lux meter.

$$\text{Average Lux} = (P1+P3+P9+P7) / 16 + (P2+P4+P8+P6) / 8 + P5 / 4$$

Uniformity Ratio = Min Lux / Avg Lux. (Generally, the minimum lux would be at P8 since it is the farthest point from both the poles.)

Thus, the lighting quality can be ensured by a mock sample installation.

Parameter		Manufacturer A	Manufacturer B	Manufacturer C
Designed Wattage	W	70	90	110
Capital Cost per luminaire	Rs.	14000	10500	10000
kWh consumed per luminaire over 50000 Hrs	kWh	3500	4500	5500
Energy Cost per luminaire over 50000 Hrs	Rs.	24500	31500	38500
Total Cost per luminaire: Capital Cost + Energy Cost	Rs.	34500	42000	49500

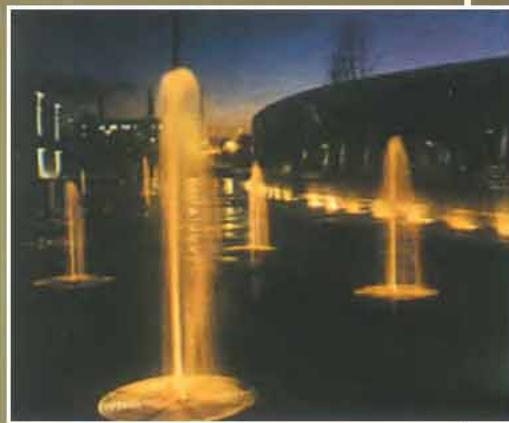
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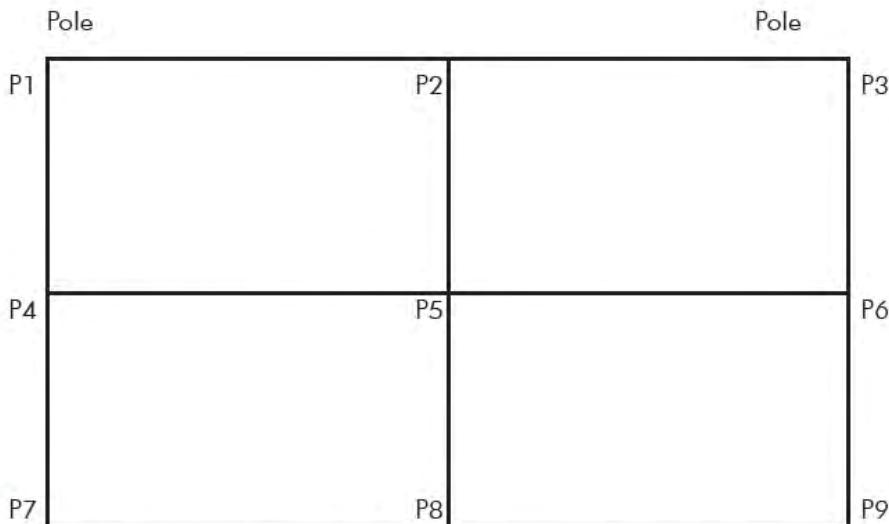
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9 point method for calculating Average Lux & Uniformity Ratio

Benefits of design-based approach

By adopting a design-based approach, the customer is taking into consideration the total project cost over the lifetime of the product, which is very practical.

At the same time, the lighting levels

and the uniformity ratios achieved are as per IS 1944 or as per customer's requirement. There is no compromise on the quality of light.

Importantly, the customer is saving maximum energy by going for least wattages from the available LED Street Lights in the market.

There may be a drastic decrease in the overall capital cost when the number of poles and luminaires are reduced as a result of longer pole span in case of new installation. In case of replacements too, saving in energy costs will be substantial.

Established in 1985 by Bakeri Group of Gujarat, Suveg Electronics is one of India's prominent LED lighting manufacturers – and has been highly innovative in the field of electronics & energy efficient lighting.

Suveg Electronics takes pride in providing India's First design-based LED Intelligent Street Lighting System for Gift City, one of the first smart cities of India. ■



Khush Bakeri
Partner
Suveg Electronics



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- Feeders capacity: Max 40, 8 mm (standard)
- (Option 160), (ETF) Double Tape Stick, Tray

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JX-100 LED
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- Feeders capacity: Max 40,8mm (standard)
- (Option 60), Stick, Tray

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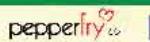
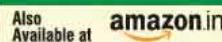
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At Surya we manufacture LEDs that ensure energy savings, lower maintenance costs and assure an impressive lifespan - distinct advantages which propel the LED revolution forward. Surya Roshni presently manufactures almost all the LED products in-house, backed by strategic marketing initiatives and a strong trade channel. The group manufactures quality LED products with a world class manufacturing infrastructure, at its fully integrated plants in Kashipur (Uttarakhand) and Gwalior (M.P), supported by Surya Technology & Innovation Centre (STIC) at Noida – an advanced state-of-the-art lighting laboratory and research centre with specific focus on LED.

Its LED product portfolio has both indoor and outdoor luminaires. The LED lamps save up to 85% energy, when compared with incandescent bulbs and have a long life-span of 25000 hours. Many new products such as High Beam Angle LED Lamps, Color Change LED Lamps, New Range Down lighters, LED Torch with Dry Cell Battery & Rechargeable, Rechargeable Lantern, Spot Lights and LED Wall Light will also be introduced as part of the Group's plan to cater to the growing demand of the customers. Surya Roshni has registered CAGR of 20% as compared to the Indian lighting market CAGR of 12%. And while the LED market is growing at a high speed at the rate of 60%, Surya Roshni has registered 300% growth. We are fired by an ambitious revenue target of Rs. 500 crs. in LED segment by 2016-2017, and at the same time, help the nation save more energy and be more eco-friendly.

Ongoing government initiatives like DELP and the Prakash Path programme for LED street lights, imply that the market is poised to grow substantially in this segment. Technologically-ready companies like Surya Roshni can help in the government decision of changing all street lights and lights in public spaces to LED. The group MD, Raju Bista says, "The Make in India campaign launched by the Government shall provide an extra impetus to both Surya Roshni and the LED Industry to grow faster. Displaying a firm commitment to stay competitive, we at Surya are committed to the progress of Make in India campaign and are also participating in all tenders of LED Bulbs & LED Street Lights". Bureau of Energy Efficiency's star rating plan for LED lamps shall further enhance lumen efficacy of lamps.

Since inception the conglomerate has believed in the power of transformation, turning energy into happiness and living up to its promise of achieving brilliance at everything. This underlying ethos has not only transformed the Surya Roshni of today into a leader in Lighting and Steel Pipes sector, it has also helped it carve a niche in the Home Appliances and Fans segment, enabling it to earn respect & recognition as a credible multinational.

Today Surya has a global footprint with an international presence across 44 countries. Its network of over 2000 distributors and 2 lakh country-wide dealers is its strength, which helps it to be present in every nook and corner of India. Surya's product range demonstrates the group's relentless commitment to performance, customer satisfaction and superior value. The group is one of the most trusted brands in India. But it doesn't allow itself to rest on achieved laurels. Instead, it treats each milestone as a stepping stone to rise to even greater heights. With a nationally and internationally accepted "Brand Surya" and pre-eminent position in the Indian lighting industry, Surya is poised to capitalize on the immense opportunities unfolding in the global market, giving it an edge over its peers.



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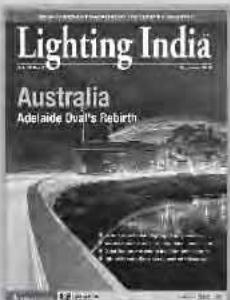
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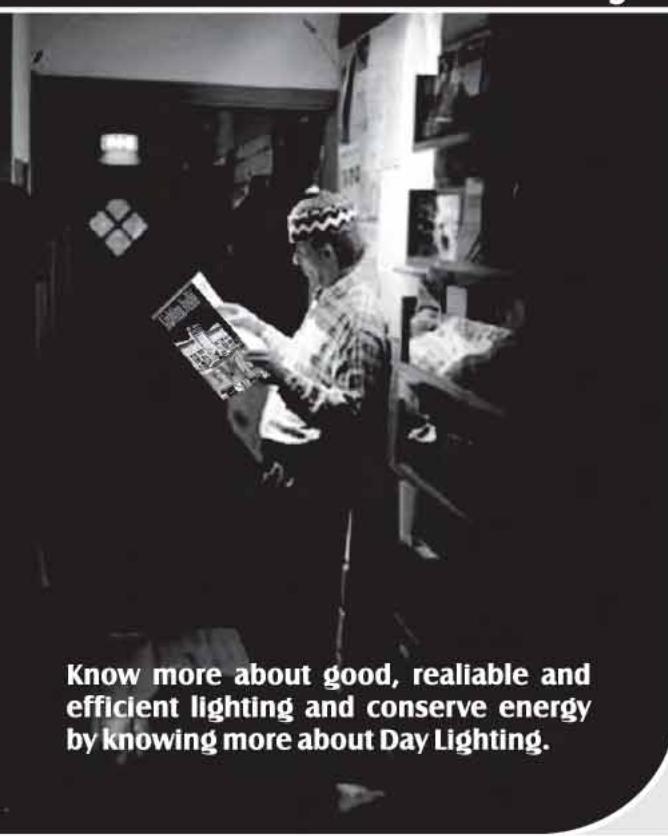
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COP 21 & Lighting



New announcement includes global funding for U4E to support national/regional implementation of energy efficiency policies, actions, and projects...

The United Nations Environment Programme (UNEP) and the Global Environment Facility's (GEF) United for Efficiency (U4E) initiative and its lighting chapter, en.lighten, announced exciting new projects during Energy Day of the United Nations Framework Convention on Climate Change (UNFCCC), 21st Conference of the Parties (COP21). The partnership includes the United Nations Development Programme (UNDP), the International Copper Association (ICA), the environmental and energy efficiency NGO CLASP, and the Natural Resources Defense Council (NRDC). The partnership also includes the private sector partners of ABB, Arçelik, BSH Hausgeräte GmbH, Electrolux, MABE, OSRAM, Philips and Whirlpool Corporation.

Following are excerpts from the report on the announcements of projects, assessments and new global initiatives that were made during several events at Energy Day (7th December) at COP21 in Paris:

Approval of GEF programs and projects...

The announcement includes global funding for U4E to support national/regional implementation of energy efficiency policies, actions, and projects. Further, national projects were announced for Costa Rica (lighting, refrigerators, and air conditioners), Kazakhstan (domestic appliances, and Sudan (lighting and air conditioners). The projects will be implemented with country partners, UNEP, UNDP and support from U4E private and public sector partners.

Release of the U4E country assessments

The country assessments show the large financial, environmental, and energy benefits the transition to energy

efficient lighting, refrigerators, air conditioners, electric motors, and distribution transformers can deliver. The assessments are available for approximately 100 countries in Latin America, West Africa, Southern Africa, Middle East and North Africa, Southeast Asia, and South Asia.

New street lighting assessments and guidance

UNEP en.lighten initiative, les Eco Maires, the French Environment and Energy Management Agency (ADEME), Philips Lighting France, Osram France, Sunna Design, World Bank, IEA 4E SSL Annex and the Climate Group released a guidance note and city lighting assessments on approximately 30 French cities, showing the potential financial, GHG, and energy savings of transitioning to LED street lighting.

It is estimated that LED street lighting can result in energy savings 40 to 70% higher compared to traditional lighting technologies, and their maintenance costs are close to zero due to their very long lifetimes.

Launch of the global lighting challenge

Led by the Clean Energy Ministerial and UNEP through its en.lighten initiative, the Global Lighting Challenge was launched to begin a race to reach cumulative global sales of 10 billion high efficiency, high quality and affordable advanced lighting products, such as Light Emitting Diode (LED) lamps.

The challenge now is seeking additional commitments from public and private sector leaders to accelerate the 10 billion goal.

National Stadium Warsaw

**Architects:**

gmp Architekten, Berlin

Photographers:

Florian Licht, Traxon Technology, Lichtvision

Location:

Warsaw, Poland

Written brief

As the National Stadium Warsaw is located on the site of the former 10th – Anniversary Stadium on al. Zieleniecka in Praga Poludnie district, near the city center, the design team's main brief was to transform the new landmark building at night time. The main idea was to use the whole facade as a static landmark or a low resolution screen. The illumination transforms the facade material, so the lighting effect is extraordinary, emphasizes the rhythm of the facade architecture and closes visually the translucent metal mesh facade panels at night.

How a pre-planned lighting scheme does enhance visibility and create a distinguished appeal that can be understood from this lighting project. This is a combination of a number of careful considerations that meet most of today's demands from a good lighting architect...



The facade itself consists of expanded metal surfaces that are arranged with a diagonal offset and inspired by the national colours of Poland, red and white (silver). Based on pre-programmed scenes, different moods from within the stadium can be projected onto the facade; five dynamic lighting scenes and three static ones have been pre-programmed. The 'circular' resolution of 144 x 11 pixels arises from the specific construction. Each of the 1,584 expanded metal plates of about 6m x 2m can be considered as an independently controllable pixel.



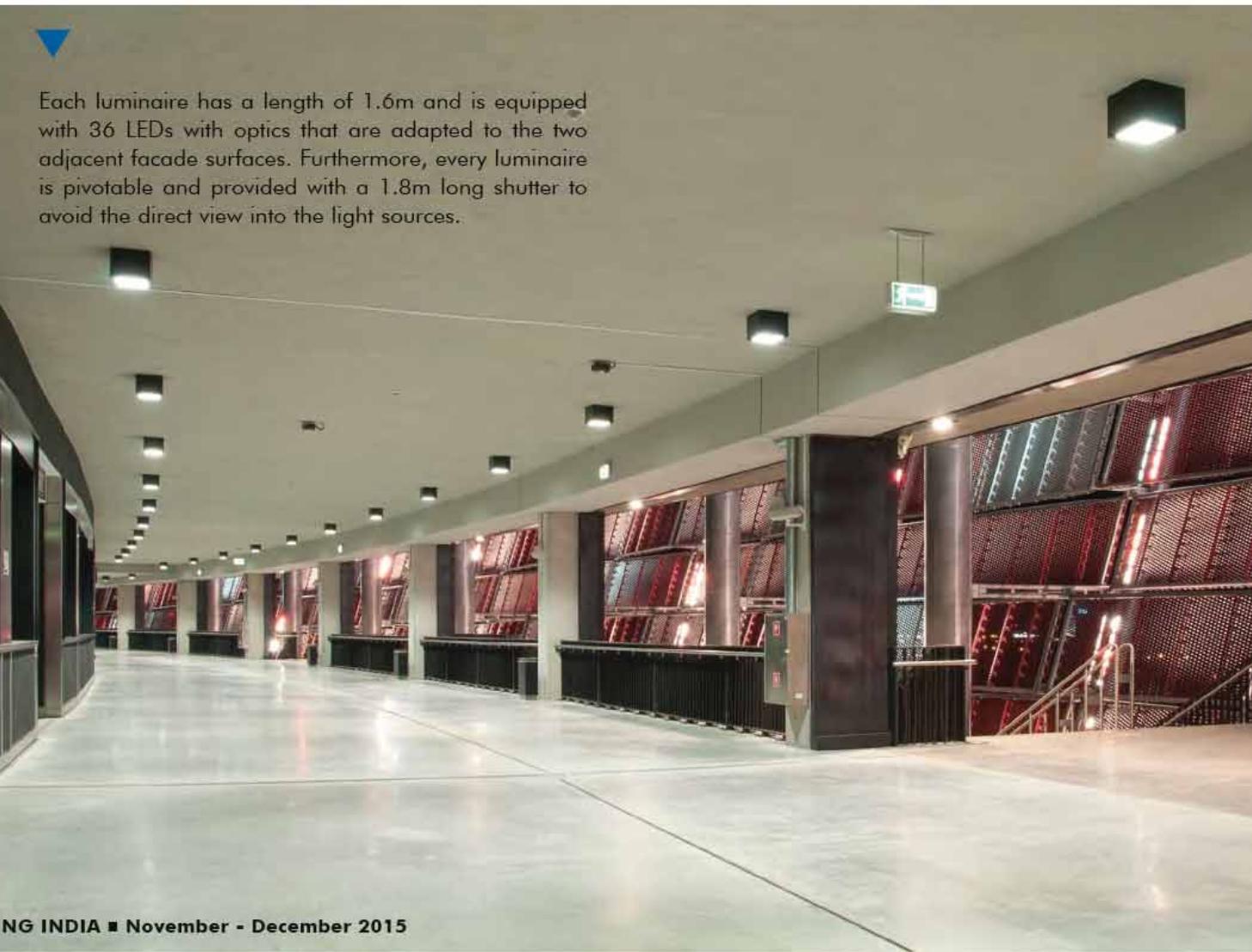
While the daylight availability in the areas directly behind the facade is of essential importance, the chosen panels of expanded metal provide a sufficient transparency on one hand and on the other they reflect enough light to provide a staging with a dynamic illumination.



The exterior lighting around the stadium fulfils the requirements of safety and leading of the spectators – and is realised with unostentatious lighting elements, the light column and handrail integrated LED luminaires. The lighting design for the circulation areas was focused to bring the illumination only to the horizontal surface to clear the view on the architectural masterpiece.

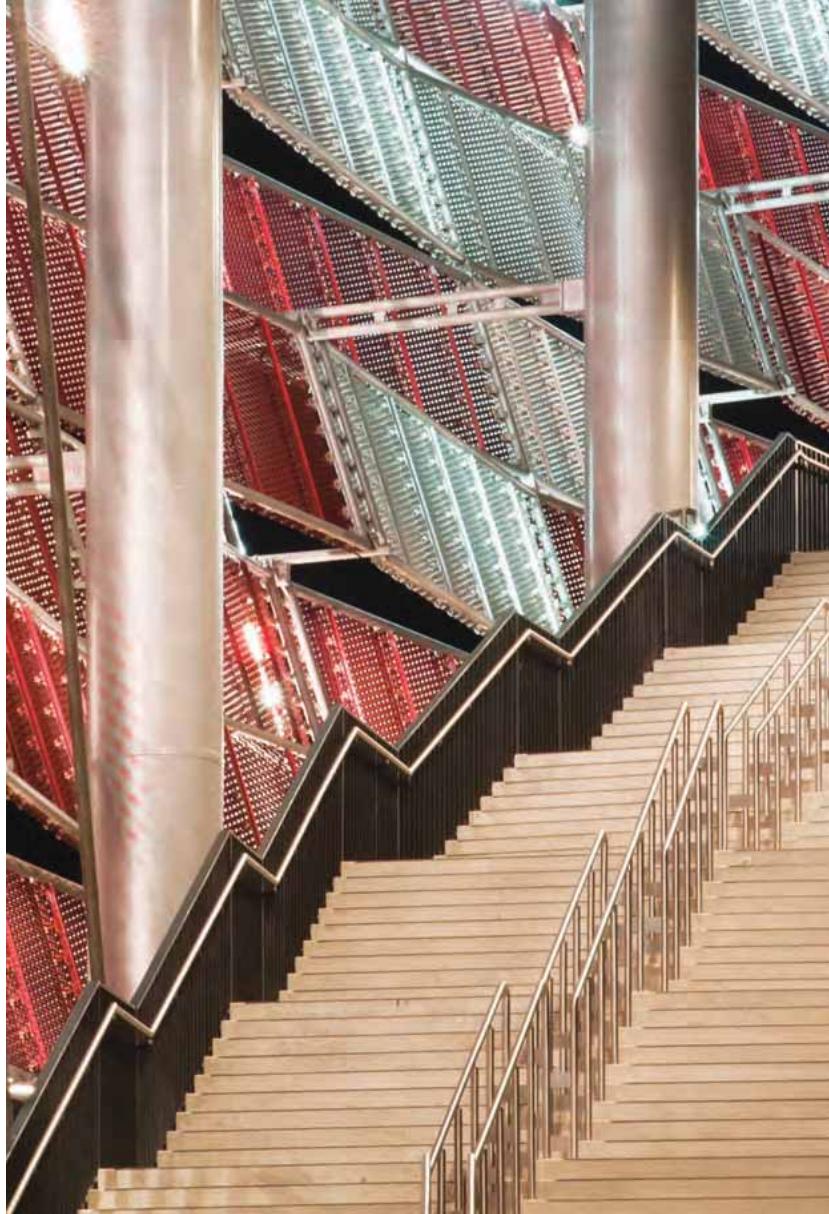


Each luminaire has a length of 1.6m and is equipped with 36 LEDs with optics that are adapted to the two adjacent facade surfaces. Furthermore, every luminaire is pivotable and provided with a 1.8m long shutter to avoid the direct view into the light sources.



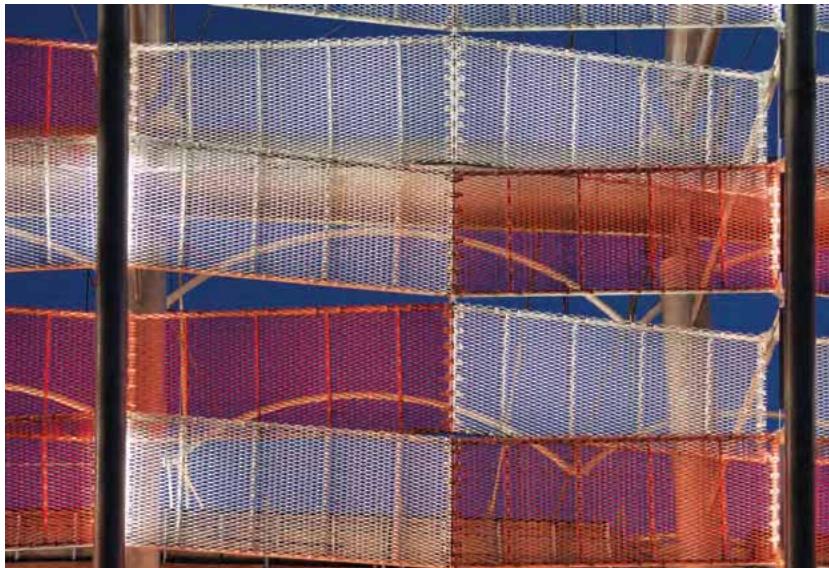


▼ The media facade is crowned at the top of the building by 'floating' spot lights.



▼ The lighting solution has been designed as an integral component of the facade construction. Over 1,500 linear LED luminaires are mounted behind the large pillars in order to wash the expanded metal surfaces.

After extensive mock-ups, light colours and styles have been selected in order to achieve the best possible impact of the architectural material. The luminaires equipped with 2/3 white and 1/3 red LEDs are assigned to the red fields, while the white ones are illuminated with white LEDs of the light colour 5000 K.



Designing An Outdoor Lighting Solution

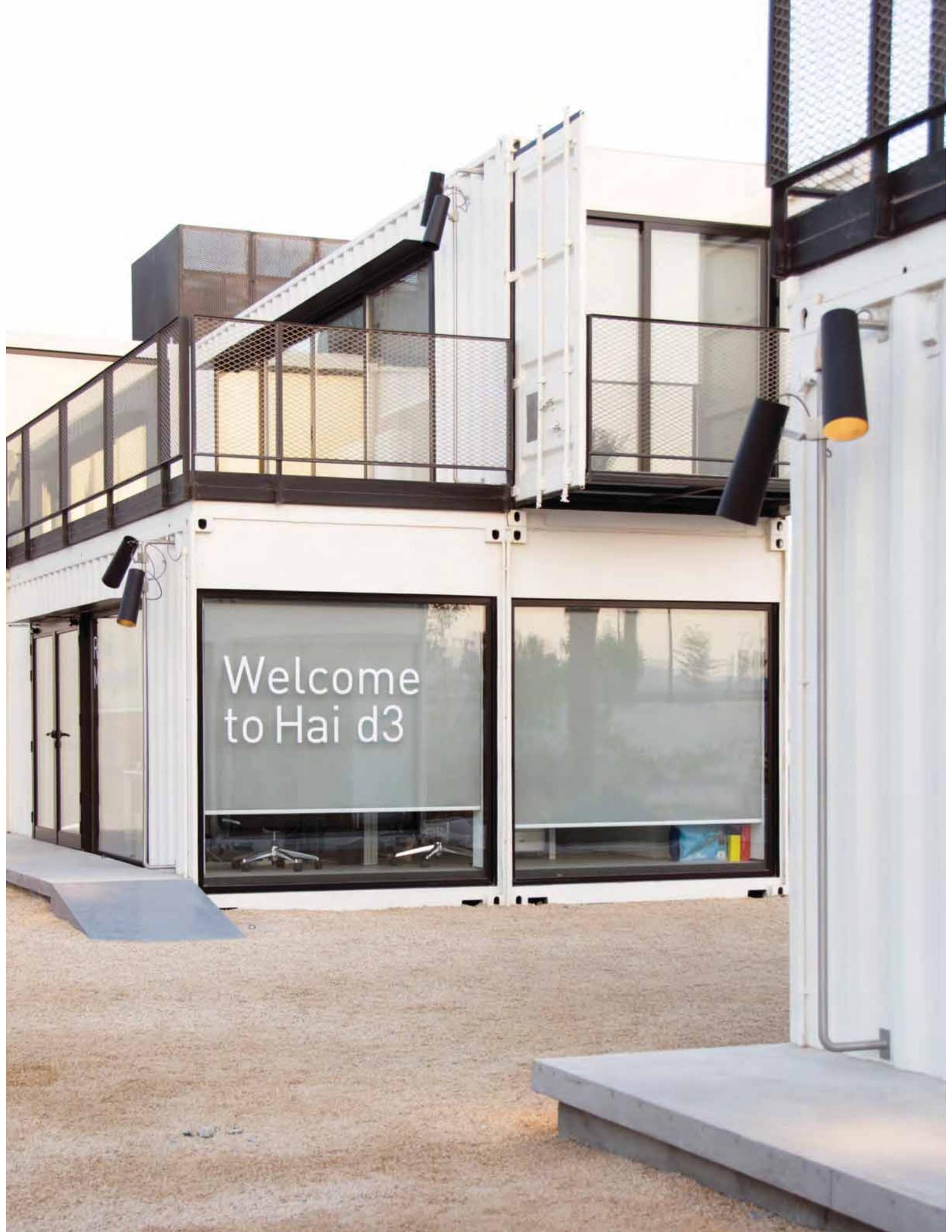


For A Unique Creative Habitat

.PSLAB collaborated with IBDAA and d3 on the design and build of the lighting of an urban, relaxed environment. See the result...

Dubai Design District, d3, was developed to provide a creative ecosystem that surpasses the expectations of a typical creative neighborhood. It has its own beating heart; its own spirit and its own personal style. This is a place where bohemians can live, work and play. Where aspiring designers can cut their teeth and learn their trade; where local talent can work alongside international design, art and fashion houses. It is, at its heart, a place where creative minds can come together to realise their dreams.

The Arabic word for 'neighbourhood', Hai reflects the importance of community spirit in the Dubai Design District. Hosted in a total of 68 white recycled containers, Hai d3 aims to contribute to the creative and cultural development of Dubai by presenting and hosting a program of events and participatory activities for Dubai's varied creative communities.



Welcome
to Hai d3





.PSLAB collaborated with IBDAA and d3 on the design and build of the lighting of this urban, relaxed environment. In an effort to structurise the lighting intervention, .PSLAB's initial steps were studying the modular containers according to height, composition, understanding the ambient glow diffused from the existing interior lights and designing a tailor made outdoor lighting solution for a unique creative habitat.

The U shaped rod mounted projectors are fixed on the outer surface of the containers, positioned in the dark areas, between the horizontal edges, shedding the needed light on the different levels. The fixation plates are a bespoke solution, designed to fit the pattern of the container panels. The directional projectors are made from steel with a powder coated finish and supported by stainless steel, naturally finished rod, complimenting the industrial feel of the containers. ■

Abbo
Brand Communication Director



Energy Efficient Home Lighting Design

Lighting in homes consumes 8 to 15% of the average household electricity budget although the makeup of the installed lighting technologies, lighting design and user behaviour can make a difference. Efficient and well-designed lighting can yield household energy savings. Effective lighting design means putting light where it's wanted and needed, and reducing or eliminating light elsewhere...

Thoughtful lighting design combines many daylighting and electric lighting strategies to optimise the distribution of light inside the building. It considers whole building energy impacts to minimise the building's overall energy usage and integrates the design of daylight entry (through windows and skylights) with electric lighting, including controls. It takes advantage of shading strategies and glazing technologies to moderate the intensity and spectrum of the daylight admitted to the home, to minimise heat gain during the cooling season and heat loss during the heating season. It chooses the best window aperture sizes, glazing and shading design for each orientation to reflect the expected solar angles, heat gain and glare criteria (see Passive design; Design for climate; Orientation; Shading; Glazing; Skylights).

Daylighting and Electric

Design your new home to not require electric lighting during daylight hours. The science of 'daylighting' deliberately uses daylight to reduce or negate the need for electric light. Sources of daylight include sunlight, which is an intensely bright, directional beam, and skylight, a diffuse light of about one-tenth the illumination of sunlight. Daylight is dynamic, constantly changing its characteristics (intensity, colour, direction).

A goal of all new homes should be to not require any electric lighting during daylight hours. Siting, orientation and size of the home come into play but every consideration should be given to minimizing reliance on electric lighting during daylight hours.

Proper daylighting design can deliver a net saving on energy consumed by the building. Improper daylighting it most commonly increases the heat load on the home and its cooling energy consumption. If the daylight control system is poorly implemented, building occupants have to deal with glare and/or thermal discomfort using the most expedient means at hand (e.g. curtains drawn, operating air conditioner), which in turn negates any benefit that daylighting might have offered (see Passive design; Shading).

Home Orientation for Daylighting in India

- Direct solar gain or loss is effected by windows and hence are the major cause of comfort or discomfort. Under Indian conditions, less than 10% of the floor area should be used as window area in hot regions and north-side windows should be larger than those on other three sides. Also, proper shading should be provided in the windows to reduce excess solar gain. On the contrary, in colder regions, windows can occupy up to 20% of the floor area and windows on south side should be larger than those on the other three sides. In extreme cold climates, windows should be perfectly sealed.

- About 25 - 30% of total heat gain/loss are estimated to be through walls. Proper materials need to be chosen for walls depending upon cooling and heating load. Burnt brick walls are used in hot and moderate climates. Humid climate prefers exposed brick walls for allowing the building to breathe. Cold regions prefer hollow and light concrete blocks. Baffle walls are a good choice for allowing ventilation and avoiding direct sunlight to enter. Proper shading in the form of overhangs is required to avoid heating of walls in hot regions.
- The colour of wall should be ideally light shaded except in extreme cold regions where grey or black colour helps in solar gain to a great extent. The surface of walls in hot region should be rough and self-shading types. In any case the surface finish should be resistant to the effects of moisture to avoid decay of building materials. It is always profitable to have a roof surface of broken glazed tiles under most Indian conditions.
- Skylights and light tubes of appropriate sizing and design can let in light without adding heat in summer or losing warmth in winter.
- Externally reflected daylight contains less heat than direct penetrating sunlight (i.e. the infrared heat is predominantly absorbed by natural and built environments).
- Light coloured interior surfaces reflect more light and reduce the level of artificial lighting required.
- Clerestories (with the associated eaves appropriately sized) are very effective at delivering daylight to the core areas of a home.
- Sunny locations can exploit tubular daylighting devices – tubular skylights – which send direct-beam sunlight into the space below and are capable of delivering very high illumination levels when the sky is clear.
- Direct sun should be excluded from task areas (particularly polished surfaces including kitchen benches and desktops) because of the high potential for glare and discomfort.
- Internal sun penetration can be controlled with the least impact on an external view by vertical blinds on predominantly east and west oriented windows and horizontal blinds for predominantly northern (and southern, for north of the tropic of Capricorn) oriented windows.

Electric Lighting in the Home

Use of electric lighting in the home has two aspects: specific task lighting and creating a night-time ambience for a room or space.

Human vision has a very high dynamic range but perception of brightness shifts with the overall brightness of the entire space. The eyes adapt to low light levels at night and it is unnecessary to try to duplicate the high level of illumination available from daylight.

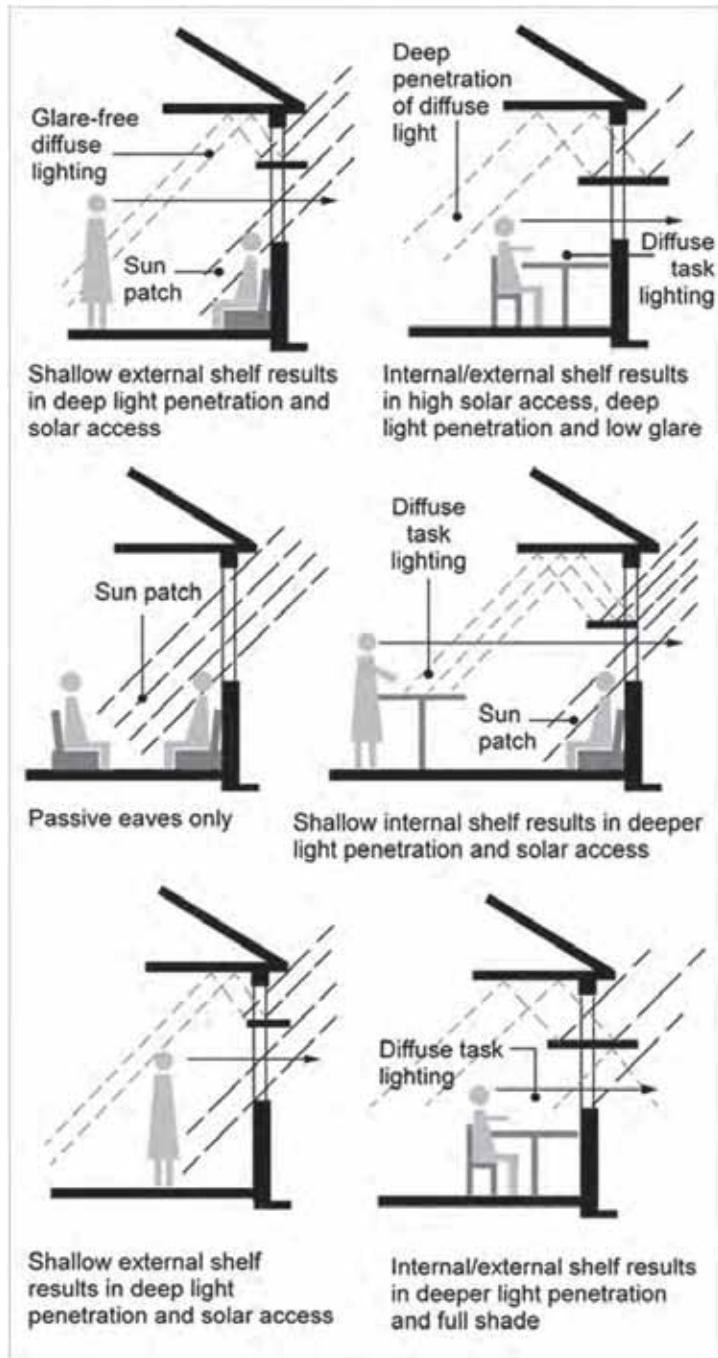


Figure -1 Light shelves reflect light deeper into rooms...

When considering lighting a space, work on points of interest within. The human eye is attracted to bright objects and accordingly should be rewarded with something of interest. By contrast, dark areas are of limited attraction but serve to accentuate (by contrast) the brighter objects of interest. Use highlights (about 10 times the ambient light level) to draw attention to key objects or spaces in a room, or for lighting specific tasks.

Carefully select features to highlight (e.g., artwork, sculptures, and furniture items) and use the minimum effective highlight level so you don't waste energy.

Reading lamps or table lamps are an effective, flexible and efficient means of giving higher task lighting rather than increasing general lighting of the entire space. They can also be part of the accent lighting for mood setting (e.g. table lamp on side table in lounge room).

Ambient or electric illumination

Plan your lighting to complement your lifestyle. Consider the activities that occur in each room, the atmosphere you want to create and the decorative elements you want to highlight.

Consider in particular the areas that serve more than one purpose and require more than one style of lighting (e.g., relaxed entertaining, media viewing, reading/writing, general activity). Use separate lighting solutions and circuits for each function rather than integrating them into a single circuit. Lights may need to be on separate switches, and/or dimmers used to create the lighting desired.

Each lamp type has advantages and disadvantages and good design uses an appropriate type for each application.

Remember:

- Light is heavily absorbed (wasted) in dark-coloured rooms.
- Light can be indirectly reflected (i.e., cove and pelmet lighting) to create very subtle background illumination but only in light-coloured rooms/surfaces.

There is no 'best' lamp for all applications. Of the many alternatives, each has advantages and disadvantages: good design uses an appropriate lamp/light fixture for each application.

The various lamp technologies generate light differently. Choose lamps best suited to producing desired lighting effects such as light distribution, switch-on time and dimmability.

For example, some Compact Fluorescent Lamps (CFLs) take a few seconds to strike and 'warm up', and are thus unsuitable where use may only be for a few seconds (e.g., kitchen pantry) or where lights are switched on and off quickly. CFL lamps, although efficient, are an inferior choice in these rooms to tungsten halogen or even LEDs, although LEDs may not have the cost benefit for such short uses.

Most rooms need two types of lighting: general lighting and task/accent lighting. Use different lamps and light fittings for each purpose.

General ambient

Ambient lighting provides overall, general lighting that radiates a comfortable level of brightness. A central source of ambient light in all rooms is fundamental to a good lighting plan.

- Use Omni-directional (light in all directions) lamps in pendants, chandeliers, ceiling or wall-mounted fixtures.



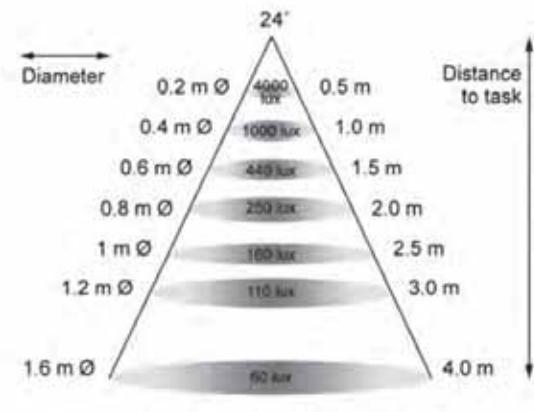
Figure - 2 Directional light fittings complement ambient lighting...

- Avoid using downlights for general illumination. They make bright 'pools' of light on the floor (most floor surfaces absorb as much as 80% of the light) while making the ceiling cavity appear dark, which creates a 'gloomy' ambience. Downlights are better suited to task lighting over work spaces. Up to six downlights can be needed to light the same area as one pendant light. Think about other ways of lighting with fluorescent Omnidirectional lamps before installing downlights or if used, fit lower wattage and more efficient bulbs.
- Choose light fittings and lamp shades that allow most of the light through so a lower wattage lamp can be used. Some light fittings can block or absorb 50% or more of light.

Task lighting

Task lighting is used to illuminate specific tasks such as reading, sewing, cooking, homework, games or hobbies. Accent lighting adds drama to a room by creating visual interest. It can emphasise paintings, house plants and collectables, or highlight the texture of a wall, drapery or outdoor landscaping.

- Directional lamps or downlights, such as LED or halogen reflector lamps, are best employed for this purpose.
 - Use desk/table/floor lamps in areas where the activity or furniture is likely to change positions (lounge, dining, bedrooms)
 - Where illuminated task surfaces will not change (e.g., over kitchen benches), use fixed directional lighting.
 - Make sure task lighting is free of distracting glare and shadows but bright enough to prevent eye strain.
- Key points for selecting the appropriate beam angle for directional lamps:
- Beam angle is the angle at which



Edge illuminance approximately 1/2 of centre illuminance

light intensity drops to 50% of centre beam intensity. Virtually all (around 90%) light from a directional lamp is in the beam and very little light reaches other surfaces outside the path of the beam.

- Basic rule: for the same wattage lamp, the smaller the beam angle the brighter the surface illuminated but the smaller the area illuminated.
- Select the appropriate beam angle by determining the largest dimension of the feature to be lit and the distance from it. The packaging of most directional lamps generally shows a simple graphic to help select the appropriate beam angle.

Luminous flux (the perceived power of light) at the beam angle light intensity drops to 50% of center beam intensity.

Colour of light

Two ratings are used to describe the colour of white light sources:

- Correlated Colour Temperature (CCT)
- Colour Rendering Index (CRI).

CCT, measured on the Kelvin (K) temperature scale, describes the 'shade' of white light emitted.

The material and colour of your furniture can play a role in your decision to use warm or cool lights, since the variation of lighting colour can make room colours appear very vibrant or quite dull.

Common colour temperatures and their typical uses...			
CCT (K)	Colour designation	Appearance	Typical uses
2,700–3,200	Warm white	Similar to incandescent	Household rooms
4100	Cool white	Neutral light	Offices, garages, workshops
5,500–6,500	Daylight	Cold, harsh, unrelaxed light	Bathrooms, laundries

Correlate colour temperature

Unit: Kelvin **Role:** scale to describe how 'warm' or 'cool' the light source appears **Origin:** in theory, as an object (e.g., piece of metal) is heated, it glows, changing colour from a red to orange to yellow to white to bluish-white as the temperature increases.

CCT of typical residential lamps

Incandescent lamps: operate by heating the filament to 2,700K and by definition, have a colour temperature of 2,700K.

Fluorescent, CFL and LED lights: available in a wide range of colour temperatures.



Cool white (left) and warm white (right) colour temperature lamps give rooms a different appearance.

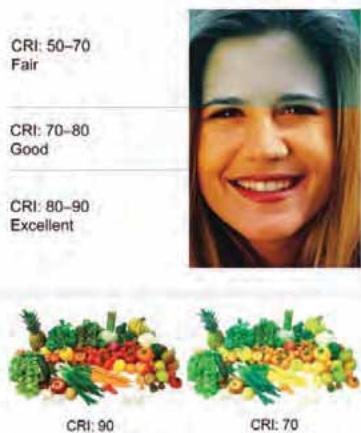
Match the lamp's colour temperature to the tones of your room. Warm colour temperatures render warm colours like reds, yellows and browns well; cool colour temperatures render cool colours like greys, greens and blues better. In rooms following these general rules, furnishings appear more vibrant. If you have a mix of furnishings, use lamps that produce light in approximately the 3,500K range. No matter what colour temperature light you choose, if it has a low colour rendering index, nothing will look good under it.

Colour rendering

Unit: none **Role:** scale between 100 and below 0 where 100 represents true natural colour reproduction for that particular colour temperature **Origin:** a reference source such as sunlight is defined as having a CRI of 100; incandescent lamps radiate a similar spectrum of light to the sun.

CCT of typical residential lamps

Incandescent lamps: 100 Fluorescent, CFL lamps: 60–95 LED lamps: 80–90.



The colour rendering index rates the portrayal of colour. CRI rates the ability of the light to accurately portray colours of objects in the space being lit. A CRI of higher than 80 is usually adequate but for specialized tasks where colour is important (food preparation, applying makeup, painting) it is advisable to choose lamps with a CRI above 90. Lamps of the same colour temperature can vary in their ability to render colours correctly.

Time control

Time of use, hours of use, and occupancy of and traffic through spaces vary in the home. Switches and controls can be a very effective method of providing lighting only when and where it is required.

Some basic principles

- Provide multiple switches to control different lighting elements (ambient, accent or task) in a room where all may not be required all the time. One switch to turn on all lights in a large room is very inefficient. When choosing switching groups always begin with lighting that is needed most, such as that over the kitchen benches, then work backward. Place switches at exits from rooms and use two-way switching (for long hallways or stairwells) to encourage lights to be turned off when leaving the space.
- 'Smart' light switches and fittings use movement sensors to turn lights on and off automatically. These are useful in rooms used infrequently where lights may be left on (for very long times) by mistake, or for children, the elderly and people with disabilities. Built-in daylight sensors make sure the light doesn't turn on unnecessarily during daylight hours.
- Use timers, daylight controls and motion sensors to switch outdoor security lights on and off automatically. Similar controls are particularly useful for common areas, such as hallways, corridors and stairwells, in multi-unit housing. Some controls are not compatible with particular lamp types so seek advice.
- Consider using solar powered lighting for garden and sensor security lights.
- Modern dimmer controls save energy and also increase lamp life. However, reducing light output to 50% saves only about 25% of the energy (for a halogen lamp). If you dim some lights most of the time, consider replacing them with lower wattage lamps.
- Most standard fluorescent and LED lamps cannot be

dimmed (although this is improving), but special dimmers and lamps are available (check packaging or manufacturer's website for information), when installing new light fittings and controls.

Lamp technology selection summary

In India, only incandescent, CFL and linear fluorescent lamps are regulated for energy efficiency and light quality. Other lamp technologies can vary greatly in quality. Read packaging information and technical specifications carefully to ensure the product is suitable for your intended use.

Top ten steps to lighting

- Design a house to not need lights turned on during daylight hours.
- Consider the orientation and layout of rooms to best use available daylight.
- Use surface reflectance of light coloured surfaces, and well positioned pendant and wall lights, for good light distribution in a room.
- Decide the type or types (e.g., general lighting, mood/background lighting, task lighting) of ambience you wish to create in each room during night-time use.

- For more than one type of ambience, adjust light levels (dim lights) or turn different lights on or off through different switching circuits.
- Create task or accent lighting with directional lighting.
- Create general lighting with non-directional lighting.
- Use warm coloured lamps for the home, except possibly for bathrooms and laundries where the cooler coloured lamps present an appearance of a clean, sterile space.
- Before selecting a lamp, identify relevant attributes for illuminating each room (e.g., quick start-up, long life lamp, dimmable, multi-way switching).
- For getting the 'right amount of light' to create the ambience you want, think about lumens, which measure of the total amount of visible light emitted by a source, not wattage (power). ■



JAY B. THAKAR

M.Tech in power system is entrepreneur in renewable energy sector. He had presented 6 research papers in national/international conferences...

Bulb Type	Bulb Image	Lamp Colour Range	Efficacy (lumens/W)	Quantity of light (lumens)	Light distribution	Lifetime (hours)	Colour rendering	Dimmable
LED		7000K 5700K 4000K 3500K 3000K 2700K	20–40	med	varies	> 20k	excellent	many dim
CFL		7000K 5700K 4000K 3500K 3000K 2700K	> 40	high	sphere	5–20k	excellent	few dim
CCFL		7000K 5700K 4000K 3500K 3000K 2700K	20–40	med	sphere	5–20k	excellent	many dim
Linear & circular fluoro		7000K 5700K 4000K 3500K 3000K 2700K	> 40	very high	sphere	> 20k	excellent	few dim
Induction		7000K 5700K 4000K 3500K 3000K 2700K	> 40	high	hemi	> 20k	good	few dim
Halogen		2700K	< 20	high	sphere	< 5k	excellent	all dim

Energy Saving In Branches Of SCB

After a successful deployment at two locations, the bank is now seeking to use Redwood for applications beyond lighting control...

The world's leading international bank, Standard Chartered (SCB) saw an opportunity to achieve significant energy savings, improve the workplace experience and capture advanced occupancy data by implementing Comm Scope's high-density Redwood sensor solution. After a successful deployment at two locations, the bank is now seeking to use Redwood for applications beyond lighting control.

Achieving greater efficiency

Headquartered in London, but doing most of its business in Asia, Africa and the Middle East, Standard Chartered Bank (SCB) employs some 87,000 people and operates over 2,000 properties in more than 70

countries. In seeking to prove the Bank's 'Here for good' brand promise, the Group's Corporate Real Estate Services Team set out to identify a lighting control system that was both user-friendly and energy efficient.

After a thorough market review, project teams for the new office buildings at Changi Business Park II in Singapore and The Forum in Hong Kong identified the Redwood Building Intelligence Platform from CommScope as the best option. With both installations now complete, the buildings are the first major commercial offices to implement the Redwood solution in the Asia Pacific region.

Redwood employs a high-density network of sensors to both power and control LED lights. By collecting data on heat, light and motion, sensors can

provide a valuable insight to the occupancy of the building, as well providing intelligence to other building systems. For example, SCB uses the sensors to turn audio visual technologies on and off in certain conference rooms at The Forum.

The bank also plans to use the sensor data to monitor space utilisation, helping to inform real estate strategies.

The Redwood platform is powered over a low voltage architecture using Category 5e, 6 or 6A twisted pair cables. Through a high-density network of sensors, the system is able to provide real-time reporting by fixture, group, floor or building.

Lighting can be controlled using the online Redwood Management software, or via a mobile device, offering an exciting opportunity for the

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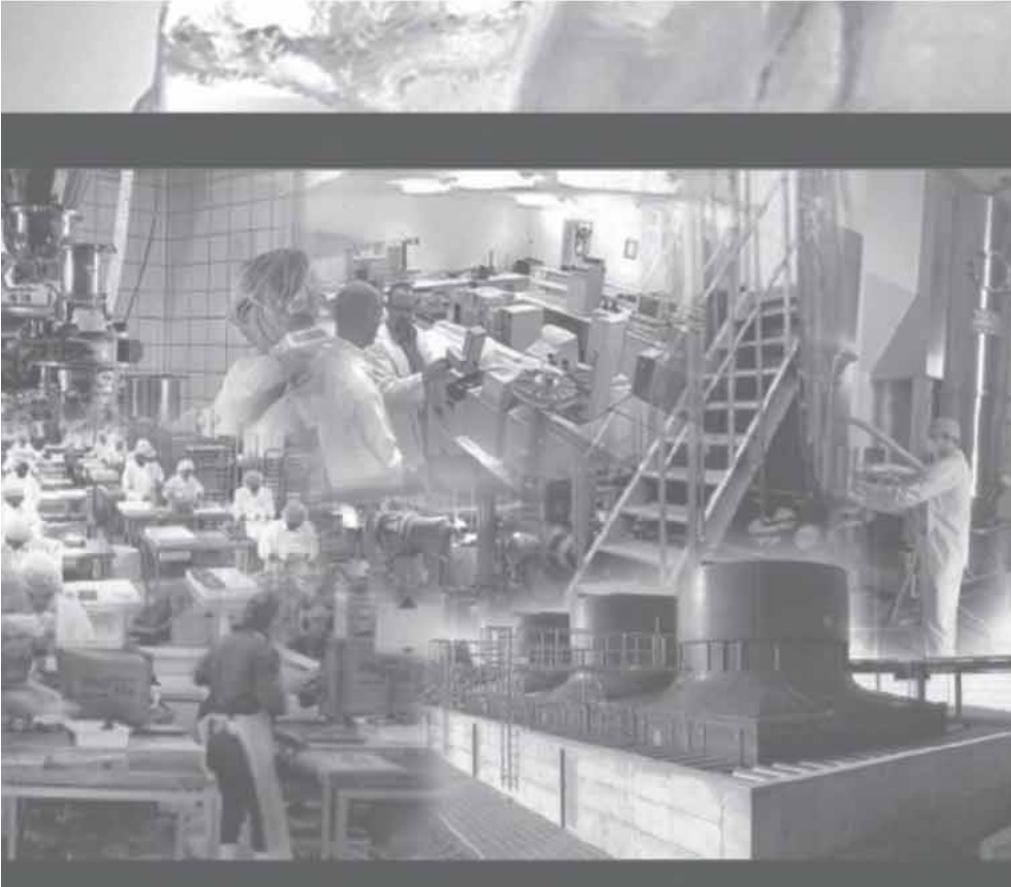
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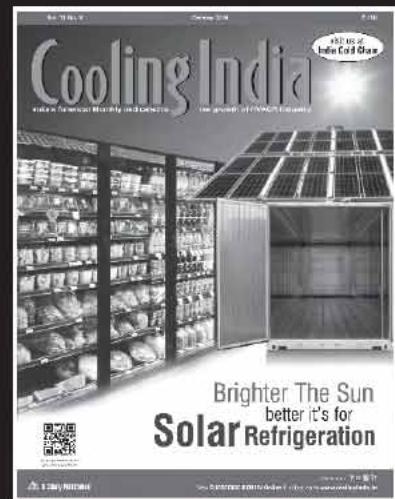
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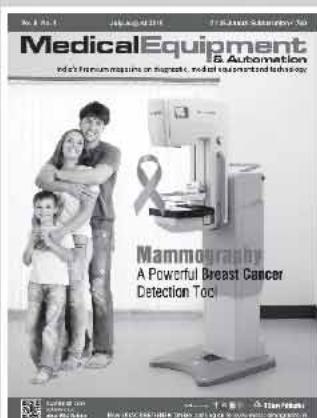


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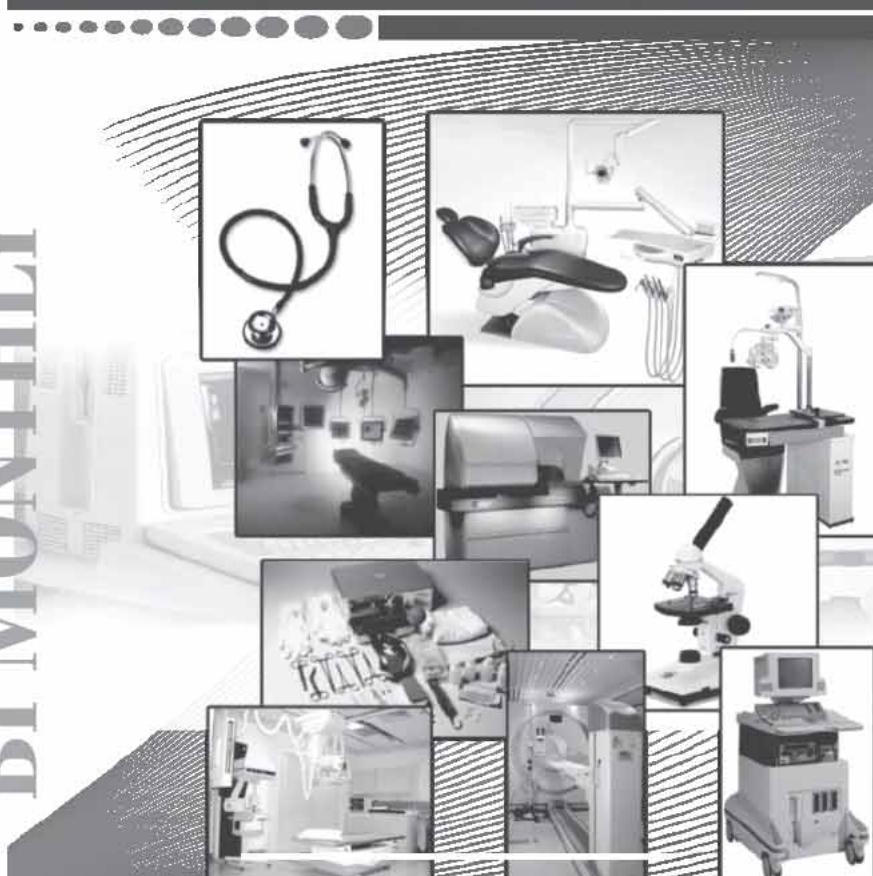
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Customised lighting scene presets are available via an SCB branded iPad application, giving employees complete control of the environment...

building occupants to digitally interact with the building.

From purchase to deployment

The business case for Redwood at The Forum and Changi Business Park II was supported by energy savings – projected as 63% in Hong Kong.

Standard Chartered Bank selected certified Partner PRO Network provider Xin Networks to design, install and maintain both solutions.

To achieve buy-in from all parties and prove the concept (particularly in relation to the quality of light emitted by the LEDs), Xin built a mock-up at an existing SCB office.

The installation was very well received by Standard Chartered Bank staff who commented on the crisp yet comfortable light produced.

Moreover, Redwood sensors were shown to create genuinely fine-grain control of the fixtures, something that the existing control system installed by the bank had failed to achieve.

Once confidence in the solution has been generated, CommScope and Xin worked closely with the general contractors (Davis Lighting in Singapore, Hover Lighting in Hong Kong) and the LED fixture company to ensure a budget-friendly, on-time installation.

Once installed, facilities management teams at each facility were provided detailed training to

ensure the Redwood software was fully utilised. At The Forum, this resulted in the system being established and power maintained at only 75% of potential light output. In addition, the intensive training provided during commissioning keeps upgrade and

lead the way, 12 major Asian-Pacific companies have already toured the on-site Redwood solution with a view toward deploying it in their own buildings.

Justin Halewood, Head, Environment, CRES, Standard Chartered Bank, says, "Redwood exceeded our expectations.



A sensor by each light fixture captures 500 to 1000 points of data per day to deliver building intelligence capabilities...

maintenance costs in-house, helping the company avoid expensive third-party consultancy support.

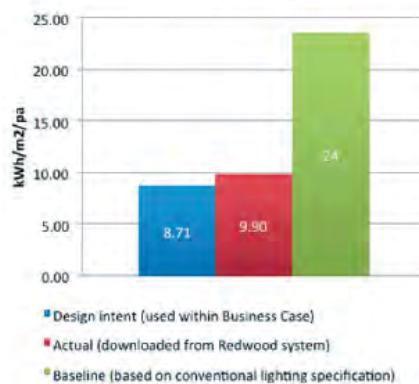
Expanding on a bright future

On a daily basis, the Redwood solution aggregates a vast amount of data on motion, temperature and light levels. For example, each motion sensor installed in the Hong Kong Forum alone captures 500 to 1000 points of data per day. That amounts to approximately 1.4 million data points per week – information SCB plans to capture and transform into actionable intelligence that will help:

- Support space utilisation studies and optimise the use of space
- Add intelligence to other building sub-systems (including conference room booking, HVAC control and security) – without adding any hardware or significant costs.

In keeping with SCB's ambition to

Lighting Energy Use Intensity at The Forum (kWh/m²/pa)



We know that The Forum uses around 60% less energy with 6% fewer fixtures than if we'd have used a conventional lighting system. In Singapore, we anticipate savings of almost \$100,000 USD during our first year of occupation alone. Perhaps the most important thing is we live up to our 'Here for good' promise, making significant progress towards our 2019 energy targets." ■

Analytics Of Artificial Lightings



Efficient and strategic artificial lighting design facilitates improvement in a building's energy performance, coupled with complimenting enhanced environmental quality inside the buildings...

Convenient and effective artificial lighting is one of the important advances of the 20th century. Artificial lighting allows us to work and play inside and outside our homes, independent of the time of day, and also often serves aesthetic purposes. However, lighting is frequently taken for granted, creating problems for occupants and also increasing operational cost.

Efficient and strategic artificial lighting design facilitates improvement in a building's energy performance - coupled with complimenting enhanced environmental quality inside the referred building.

The quality of indoor lighting is a crucial factor in determining overall environmental quality in buildings. Daylight is considered to be the best source of light for its favourable colour rendering index and its quality that closely matches human visual response.

Working for an extended time under artificial lighting is believed to be harmful to health. Despite the clear advantage of daylighting, artificial lighting is an attractive alternative to use as it allows having total control over interior lighting levels.

Many a time it is experienced that lighting (design) is largely overdesigned, leading to not only increased capital and operational cost, but it also leads to visual discomfort of occupants.

Lighting in office buildings generally contributes to 25 to 40% of the total energy consumption of the building.

Moreover, due to the excessive heat dissipated by the luminaires, there is an increase in internal heat loads of the building, which trickles down to increase in HVAC equipment sizing and its corresponding energy consumption.

Thus, optimisation of the lighting design is directly reflected in cooling load reduction, energy response, capital cost and CO₂ emissions.

An extract from one of our numerous case studies in this area, lighting design optimisation is achieved for an office building in Delhi through the use of sophisticated simulation tools.

Like any other conventional building, this building was originally designed with 45 nos. T8 lights of 2x36W each, illuminating 82 working stations over a floor area of 1850 sq.ft.

The Lighting Power Density (LPD) of the building was estimated to be 2.4 W/sq ft and contributing to almost 30% of total annual energy consumption of the building.

The replacement of T8 (2X36W) with T5 (2x28W) lighting luminaires resulted in the reduction of LPD to 1.4 W/sq ft and annual energy consumption of the building by almost 9%. This

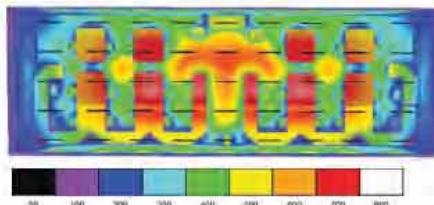


Figure 1...

design was then analysed to identify the lighting levels as shown in the lighting simulation results in Figure 1.

As observed in the image, lux levels on the workstations were observed to be 650+ lux – which is significantly higher than National Building Code 2005 guidelines of 350 lux, thereby demanding a reform in lighting layout.

The lighting layout was reviewed in terms of location, number and type of light fixtures. Optimisation of the same resulted in almost 50% reduction of number of fixtures (from 45 to 24 nos.) and thereby reducing the LPD to 0.77 W/Sqft and building's overall energy consumption by approximately 24% over initial design.

After optimising the layout, the performance of LEDs was analysed by replacing the T5 (2X28W) lighting fixtures with LED fixture (48 Watts) each. This led to further reduction in LPD to 0.6 W/Sqft and in annual energy consumption of 28% over initial design.

The lighting layout optimisation complimented with LED lighting fixtures has reduced the lighting and HVAC energy consumption of the building by 75% and 18% respectively.

Notwithstanding, lux levels on the working station got reduced to 290 lux, thereby falling short of the National Building Code 2005 guidelines of 350 lux.

The office space is then installed with a combination of Task Lighting (8x16Watt LED) and Ambient Lighting (3x18Watt CFL bulbs and 10x57Watt T5 luminaires) resulting in the LPD of 0.41 W/Sqft without compromising the visual comfort by achieving 350+ Lux at workstation level as highlighted in

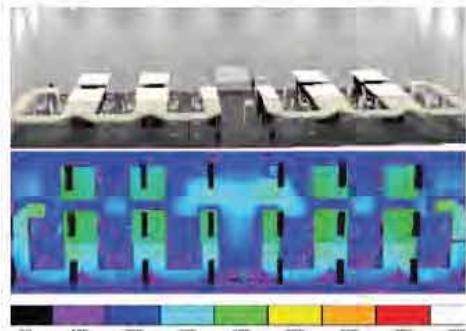


Figure 2...

the Figure 2.

Eventually incorporating the above highlighted strategies has led to 83% reduction in LPD and annual lighting energy consumption.

Annual HVAC (Heating, Ventilation, Air Conditioning) energy consumption of the building also condensed by approx. 20%, thereby enriching energy and carbon response of the building.

It implies that a good lighting design is not only about the quantity – which is only one tangent of good lighting and is only the beginning. After the minimum lighting quantity is achieved, other factors become much more important. The minimum lighting quantity depends on what light level is needed to perform a specific task.

A moonlit night or an operating room both offer appropriate light for different requirements and situations. Hence, more is not always better, and excessive light usually is a waste of energy. The fact is, some lightings is good and some is not.

We at AECOM work towards a design to ensure quantitative reduction coupled with a qualitative enrichment in the indoor lighting quality and human comfort.



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LIGHTING CONTROLS & DESIGN

Innovative Concepts

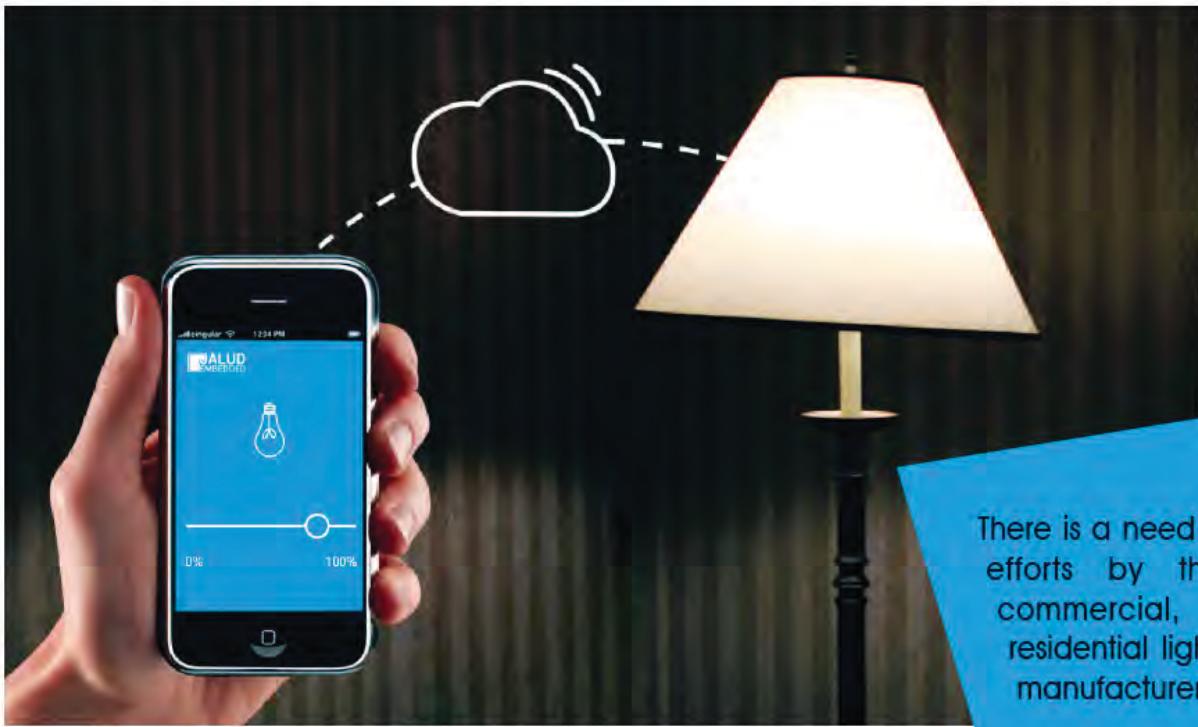
Light being the most important component of modern 24x7 life style syndrome and with increasing careless, lazy and un-concerned attitude of young generation towards natural resources, environment and cost, it becomes very important to design innovative light controls that can not only satisfy the needs of convenience and elegance but also can help in saving energy, cost and making use of daylight. The right lighting is essential as different tasks demand certain levels of brightness and concentration. Rising energy expenditures ask for a highly efficient lighting solution. Innovative light enjoy home in more ways than ever envisioned. Light can be tailored for the optimum combination of style and functionality.

Customers desire a quality of light that translates into visual comfort and promotes human interaction. They want advanced technologies and more design choices. They also want more sustainable solutions. There is a need to create not only extraordinary lighting solutions, but also enhanced life experiences. Innovative lighting solutions have quickly become the fastest growing, most respected thing in the lighting industry. There is a need for the combined efforts by the architectural, commercial, industrial and residential lighting and controls manufacturers.

Logo contro

Sensors, relays, switches, ballasts, drivers, controllers, and communications technologies for networked lighting controls

are the components of intelligent lighting system. Expansion has occurred in terms of both the variety of control systems that are available and the sheer number of systems that are being installed. With a lighting control system, we can program pre-determined patterns of light, accentuate a special piece of art, dim the lights to watch television, brighten them to read, have the desired, automated impact on a situation with the mere touch of a button. Lighting can be controlled by means of attractive keypads in varying colours and designs located throughout the house as well as by means of touch screens. Each keypad or touch screen can control a single space or a number of areas. Controls may be programmed to set lighting automatically according to a specific time of day, relative to exterior lighting conditions, or according to system presets. These settings may be different for weekdays, weekends or holidays, or for evenings when enjoying a movie or entertaining. Light controls may also be connected to the security system to activate lights in case of an alarm. Stricter directives can be observed easier with application oriented control systems. Lighting control enables all this especially through the operation of intelligent sensors. Professional lighting control also offers a distinct differentiation from competitors – whether with a stimulating illumination that not only saves energy, but also takes shopping to a new experience level. Innovative light control and design solutions offer integrated lighting control systems designed for homeowners – whose lifestyles and tastes require the ultimate



Home light control with mobile and other functionalities...

in sophistication and elegant simplicity. Lighting levels can be pre-set to create moods for entertaining, a quiet evening, family dinners, work or relaxation, or set the system's time clock to activate landscape and security lighting outside at dusk. In the midst of the ongoing transformation from previously dominant fluorescent lighting to more efficient and flexible LED lighting, the market for lighting controls has expanded broadly.

There are various market influences to implement lighting controls, of which the most important are:

Convenience: one button pressing to turn off all the lights in a house

Safety: pressing a button to immediately turn on all the outside/emergency/supporting lights. To create randomised lighting sequences to give the house a lived-in look, even in absence.

Elegance: set up scenes like dinner time or relaxation where each light or lamp can be set to its own brightness level creating the perfect mood.

Energy savings: Automatically turn off lights, dimming of lights will save money and extend bulb life. Lighting typically accounts for about 10% of the energy consumed in the home and there is much room for reducing consumption without affecting lighting quality. Major reductions in energy consumption can be gained by dimming, when a lesser amount of light is required or when the room is empty. Furthermore, since lights produce heat, unnecessary light

creates a needless burden on cooling system. Some studies show that automatic lighting controls generate energy savings of 35% to 45% in residential buildings. Programmable lighting controls reduce costs and reduce unnecessary energy consumption.

Indoor:

Need for energy savings

Utility rebates and incentives

Creating a sustainable work environment

Enhance occupant comfort and productivity

Outdoor:

Need for lower energy-use and CO₂ emissions

Attention for safety in street on roads

Increased resistance against light pollution

Drive for reducing maintenance costs

Need for green image

Lighting control and design techniques

Lighting control and design offer unique energy and cost-saving tools to streamline lighting controls in a variety of applications.

Distributed controls: These controls are ideal for large areas such as classrooms, hospitals, offices and lecture halls. Panel moves lighting control from a large central panel to smaller local panels. The advantages of using distributed controls are many.

- Eliminate home run wiring (high and low voltage)

- Local and remote programming and adjustments
- Integrate all local lighting controls into a building wide system
- Occupant sensors
- Switches or dimmers
- Photocells
- Time clocks
- Gateways to building automation, security, life safety

Daylight harvesting: This is an ideal strategy for reducing usage during mid-day peak energy rates. Daylight harvesting controls allow lights to be turned off or dimmed when not needed or reduce light output so no more light is produced than is necessary. The concept of daylight harvesting is simple. Digital photo sensors detect daylight levels and automatically adjust the output level of electric lighting to create a balance. The goal is energy savings. Studies indicate that electric lighting energy use can be reduced as much as 84%. Using digital photo sensors, natural light is detected and artificial light is adjusted accordingly to create a perfect balance. Find out the many benefits to applying this innovative energy saving technique. Until now there have been barriers to wide-spread acceptance of daylight harvesting. This is due in part to complications associated with commissioning; however, integrated lighting controls prove a solution rich in features. On average, 24% of a commercial building's power consumption goes to lighting, so controlling that output makes sense as a starting point for energy savings. This is the fundamental logic that has lighting controls mandated in over half of the country's state energy code jurisdictions.

Innovative Solutions

Switching from a traditional to an LED based lighting system can yield significant energy savings. Additional reductions in power consumption can be achieved by intelligent lighting systems that incorporate monitoring, control and communication networks. Such systems offer features ranging from dimming, motion sensing, ambient light sensing and daylight harvesting, wireless and powerline communication, to monitoring various parameters such as energy consumption, potential LED failures and LED temperature. Lighting industries are innovating and harnessing lighting technologies to develop some of the most desired products in the world. They are driving the integration of indoor and outdoor lighting, daylighting and digital controls; creating an ecosystem of products that is so incredibly smart, and yet so elegantly simple to install, commission and use. Sustainable lighting solutions provide an innovative response to user needs and offer the right amount of light where and when it is needed, without unnecessary spill. Such solutions combine the latest generation of wireless controls with brand and lighting technology independent hardware to maximise energy savings and reduce the total cost of ownership. In

addition, these solutions offer lighting assessments and service agreements for consistent lighting performance and warranted return on investment. Innovative lighting continues to break barriers in the lighting industry. Technologies have unlocked efficiencies never before possible by using ether-net cables to both power and control LED light fixtures. Governed by advanced, integrated control software, the system pushes energy savings to an unprecedented 90%. In the age of a networked world and the Internet of Things (IOT) are the future of illumination. The development of new lighting technologies such as LED and OLED lighting and wireless controls systems is not the final destination; it is the everyday road to travel but there is a need to deliver innovative, exciting and practical solutions for lighting world.

LED lighting controller: A lighting control system communicates between several system outputs and inputs related to lighting control and other computing devices. Lighting control systems are used in indoor and outdoor lighting to provide the required amount of light or to maximize energy savings. There are several different kinds of LED lighting controllers at Future Electronics. We stock many of the most common types categorised by manufacturer name and packaging type.

Our parametric filters will allow you to refine your search results according to the required specifications. Future Electronics has a wide range of LED lighting controllers from several manufacturers that can be used for your integrated circuits. By going through the selection you will find the right LED lighting controls, strobe light control, DMX lighting controller, lighting control systems, remote light control system, LED lights controller or for any application that requires LED lighting controllers. You will be able to choose from the technical attributes and your search results will be narrowed to match your specific LED lighting controller application needs. LED lighting controllers are used in:

- Scene control
- Individual LED fixture control
- Daylight harvesting
- Ambient light control
- Traffic signals and signs
- Interior and exterior lighting
- Dashboard illumination
- Backlighting
- LCD switches
- Illuminated advertising

With the FutureElectronics.com parametric search, when looking for the right LED lighting controllers, you can filter the results by manufacturer name and packaging. You will be able to find the right strobe light control, LED lighting controls, DMX lighting controller, remote light control system, LED lights controller or lighting control systems for applications requiring LED lighting controllers by using these filters. Future

Electronics also offers its clients a unique bonded inventory program designed to eliminate potential problems that may arise from an unpredictable supply of products that could contain raw metals and products with erratic or long lead times. Talk with your nearest Future Electronics branch and find out more on how you can avoid possible shortages.

Progress in intelligent lighting controls

Lighting control is much more than the use of motion sensors. It is the optimal connection of user interfaces, control units, daylight- and motion sensors and electronic control gears and performs much more. To meet the growing demand for lighting control systems, different types of vendors have moved into the lighting controls market. Leading the innovative side of this move are pure-play startup companies, which are largely responsible for the proliferation of creative ways to visualise lighting usage and devise new strategies to manage lighting energy consumption. The large, traditional lighting companies have begun offering a range of lighting control products, as well. Research reports analyses the worldwide market for lighting controls and examine sensors, relays, switches, ballasts, drivers, network control gear, network services, and communications technologies, with a specific focus on networked lighting controls. Global market forecasts for unit shipments and revenue, segmented by equipment type, building type, construction type, technology, and region. The report details the market drivers for lighting controls technologies, including building codes, hardware costs, and consumer expectations, as well as barriers to adoption, and provides profiles of select industry players.

Future of lighting controls

Lighting controls range from fully automated control systems managed by computer programs, to less technological, manual methods. The most direct savings come from actual wattage reduction, but adding controls to your lighting retrofit project can dramatically impact energy savings. There are several proven ways to successfully control a lighting system. Future of lighting controls considerations and innovations are things with which users should be aware of when considering a new or updated lighting system. Control systems of the future will utilise multiple technologies to achieve savings. Lighting manufacturers, designers, and installers will pair photocells with motion controls, and employ dual-end trimming capability. These innovations will not only save energy and money, but they can extend the useful life of lighting technology. The end goal of successful lighting design, aside from increased energy efficiency, is to get the light needed, where it is needed, when it is needed. The future also includes sustainability as a priority of successful design. One way to achieve that is to use technology pairings, like

those mentioned above or others, to advantage when designing a new system. Because so much new technology is at our disposal, control systems have become increasingly end-user personalized. Some can even be controlled with mobile phone. Lighting manufacturers have embraced this trend with products. While some of these products still seem like novelties, they have become more prevalent, more affordable, and easier to put into use than ever. We expect to see these products more widely available from more manufacturers.

There are virtually endless ways to control lighting and many help to maximize energy savings. Most of the technologies are relatively easy to implement alongside lighting upgrade to increase savings. Most of them can even be installed or carried out after a lighting project is completed. We foresee 'control retrofitting' for existing energy-efficient systems for users that are looking for additional ways to increase savings and who want to gain more control over their lighting. The technology to create buildings that can self-optimize their energy performance, ensure user comfort, and diagnose maintenance needs is here. Now the lighting industry is catching onto the vital role that this networked future will play, as the potential stretches beyond singular buildings to encompass entire cities. For the past decade, the buzzwords Internet of Things (IoT) and Industrial Internet of Things (IIoT) have been floating around, as smart products such as the Nest thermostat and wearable fitness devices captivated consumers. In the IoT, everyday objects are outfitted with sensors, microprocessors, and the ability to talk to other machines over a local system. In the IoT, objects networked together collect swaths of data for analytics, information management, and knowledge transfer to optimise large-scale systems, such as buildings, factories, highways, and cities.

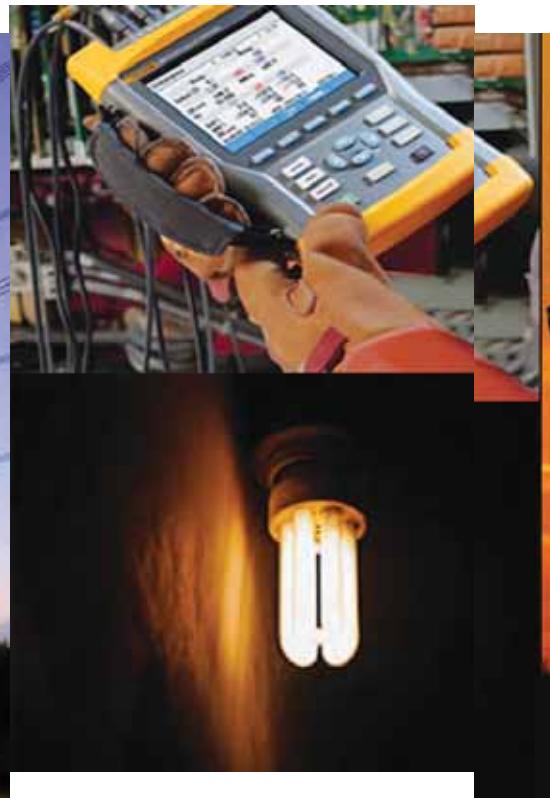
Finally, we know that legislation will continue to impact and increase the need for controls in new construction and existing facilities. There are various standards existing for energy conservation ranging from federal to municipal rules. Some municipalities have their own lighting regulations. Some have strict restrictions on light pollution for outdoor projects and specific fixtures must be specified to do a lighting project there. Control systems will become more and more prevalent as a result of legislation and as the desire to conserve resources remains a priority. ■



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Lighting Systems And Their Effect On Power Quality



The presence of even harmonics is often a clue that there is something wrong – either with the load equipment or with the transducer used to make the measurement...



New technologies in lighting have today's designers focusing a keen eye toward power quality. Power quality is the ability of an electrical system to deliver power in the safest, most efficient manner. Power quality is an important consideration in all industries, but with the advent of LEDs, Compact Fluorescent Lighting (CFL), High Intensity Discharge (HID) lighting and others, the commitment to an efficient power distribution system is more essential than ever.

Many new lighting technologies, while certainly more efficient, can adversely affect power systems through harmonics, which decrease power quality. Inefficiencies in power quality may limit the amount of devices that can be placed on the distribution network. It may also cause equipment to under-perform or to behave erratically. In the most severe cases, it can even harm the system and the devices along the network. Poor power quality management inevitably leads to an increase in operational costs and places an unnecessary strain on already dwindling resources. Therefore, lighting systems should be driven by efficient and sustainable power sources that will not unnecessarily burden the power grid, while still providing the perfect electrical environment for advanced lighting systems. The ultimate reason that we are interested in power quality is economic value. There are economic impacts on utilities, their customers, and suppliers of load equipment.

Harmonics and Power Systems

With the connection of increased electronic devices, it is necessary that we observe the quality of power. Stable voltages and undistorted waveforms are the two most desired qualities in power systems. Harmonics are a mathematical model to analyse distorted waveform.

Any periodic waveform can be expressed as a series of sine waves with varying frequencies and amplitudes. That is,

we can create a series of sine waves of varying frequencies and amplitudes to mathematically model this series of pulses. The frequencies we use are multiples of the fundamental frequency, 50 Hertz. We call these multiple frequencies harmonics. The second harmonic is two times 50 Hertz, or 100 Hertz. The third harmonic is 150 Hertz and so on. In our three phase power systems, the 'even' harmonics (second, fourth, sixth, etc.) cancel, so we only need deal with the 'odd' harmonics. This is because when both the positive and negative half cycles of a waveform have identical shapes, the Fourier series contains only odd harmonics. This offers a further simplification for most power system studies because most common harmonic-producing devices look the same to both polarities. In fact, the presence of even harmonics is often a clue that there is something wrong – either with the load equipment or with the transducer used to make the measurement.

In a three phase power system the third harmonic is the harmonic of primary interest. The higher order harmonics do not affect system performance to a very large extent. The third harmonic of each of the three phase conductors is exactly in phase. When these harmonic currents come together on the neutral, rather than cancel, they actually add and we can have more current on the neutral conductor than on phase conductors. Our neutral conductors are no longer protected as we would like.

These harmonic currents create heat. This heat over a period of time, will raise the temperature of the neutral conductor. This rise in temperature can overheat the surrounding conductors and cause insulation failure. These currents also will overheat the transformer sources, which supply the power system. This is the most obvious symptom of harmonics problems; overheating neutral conductors and transformers. Other symptoms include:

- Nuisance tripping of circuit breakers

	Company Name	Rated Wattage	Voltage (RMS)	Current (RMS)	Wattage	Power factor	Fundamental %	3rd Harmonic Current %	5th Harmonic Current %
Compact Fluorescent Lamps (CFLs)	Wipro Smartlite	20 W	231	0.12	24	0.3	100	16.1	9.4
	Compton Greaves	15 W	231.3	0.075	14.4	0.24	100	13.8	7.6
	Aspa	11W	232	0.09	10.8	0.16	100	33.6	18
	Shyam Lite	5W	233	0.05	5.6	0.15	100	21.8	11.8
	Bajaj	15 W	233.2	0.075	12	0.21	100	9	4.5
Light Emitting Diodes (LEDs)	PP LED Bulb	5W	234	0.095	2	0.1	100	15.6	26.3
	Syska	7W	233.8	0.15	4	0.1	100	41.6	21
	Philips	7W	232.1	0.04	4	0.09	100	14.5	6.2
	PromTech	7W	233.2	0.06	4	0.13	100	25.5	17.5
	LED T8	18W	233	0.1	16	0.3	100	9	6.3
Fluorescent Tubelight	Philips	49W	230	0.34	44	0.34	100	8.5	1.6

Table I : Harmonic content of different lighting systems...

- Malfunction of UPS systems and generator systems
- Metering problems
- Computer malfunctions
- Overvoltage problems

Demands for electrical energy by industry

• Oversizing Neutral Conductors

In three phase circuits with shared neutrals, it is common to oversize the neutral conductor up to 200% when the load served consists of non-linear loads. For example, most manufacturers of system furniture provide a #10 AWG conductor with 35 amp terminations for a neutral shared with the three #12 AWG phase conductors. In feeders that have a large amount of non-linear load, the feeder neutral conductor and panel board bus bar should also be oversized.

• Using separate neutral conductors

On three phase branch circuits, another philosophy is to not combine neutrals, but to run separate neutral conductors for each phase conductor. This increases the copper use by 33%. While this successfully eliminates the addition of the harmonic currents on the branch circuit neutrals, the panel board neutral bus and feeder neutral conductor still must be oversized.

• Oversizing transformers and generators

The oversizing of equipment for increased thermal capacity should also be used for transformers and generators, which serve harmonics-producing loads. The larger equipment contains more copper.

Lighting system effect on electricity

Hence it can be seen that it is of very high priority to eliminate or reduce the effect of harmonics. The analysis of effect of harmonics on different lighting systems has been carried out in order to address this issue. Lighting comprises approximately 17.5% of global electricity consumption. As the world transitions from incandescent to Solid State Lighting (SSL) technology, utilities and government regulatory agencies worldwide are concerned that, as this large segment of the consumption base switches to SSL, it will increase infrastructure costs. This is due to the reactive nature of LED-based solid state lighting, which results in higher distribution currents that adversely affect Power Factor (PF) and, in turn create a larger demand on the power grid.

The move to LED-based solid state lighting promises a significant reduction in the carbon footprint of the electrical power grid simply due to the dramatic reduction in real power consumption. However, if power factor is not managed, the grid will still need to be able to provide a much higher power level than is actually needed at the load, eliminating a significant portion of the benefits of moving to solid state lighting.

Historically, incandescent bulbs have had near-perfect power factor. Therefore, solid state lighting is being held to a much higher PF standard compared to legacy AC/DC power supplies. In most cases, power supplies are free from any form of power factor regulation for supplies rated up to 75W. However, for solid state lighting, PF regulations typically kick in as low as 5W or below.

CFLs are an energy efficient alternative to traditional incandescent lamps – because they offer similar light but use one-fourth the electricity and last up to eight times longer. CFLs are also cost effective because the initial cost can be recouped within two to three years in the form of reduced electricity bills. Moreover, CFLs can be used by electric utilities in Demand Side Management (DSM) programs to reduce peak demand levels and defer the cost of expensive infrastructure upgrades. CFL is a nonlinear load, therefore it injects harmonic to the network. In past, due to lower application of CFL, these harmonics were ignored, however today by the widespread application of CFLs; these small sources are combined and have high effect on power distribution networks.

With regulations dictating power factor requirements for solid state lighting, designers need to incorporate power factor correction circuits into the driver design. A clear understanding of the end requirements based on the intended application of the luminaries determines the type of power factor correction that needs to be implemented to enable a brighter, greener future.

Harmonic analysis of a few commercial lighting systems

A Fluke 434 II Energy Analyzer was used for measuring the voltage, current, power factor and THD content for different lighting systems. The experimental readings are shown in Table 1. Utilising the new Energy Loss Calculator function, the 434 II measures the fiscal cost of energy wasted due to poor power quality. This energy monetisation capability allows you to identify the most energy-wasteful areas of your facility so you can determine potential energy saving solutions. Add basic power quality measurements to the package and

you've got yourself one powerful troubleshooting tool.

From the experimental results, we can observe that the 3rd harmonic current in CFL is in the range of 9% to 33.6%, for LEDs in the range of 9% to 41.6% and for fluorescent tubelights around 8.5%. Hence, consumers must be careful in the choice of the lighting. Based on these studies there is need to formulate a policy on monitoring the harmonic content injected into the grid due to these new lighting systems. Lights that are not branded gave even worse results and have not been included here. The above experiment can be done by the consumer with the following intent:

- **Energy monetization** – calculate the fiscal cost of energy waste due to poor power quality
- **Energy assessment** – quantify the before and after installation improvements in energy consumption to justify energy saving devices
- **Frontline troubleshooting** – quickly diagnose problems on-screen to get your operation back online
- **Predictive maintenance** – detect and prevent power quality issues before they cause downtime
- **Long-term analysis** – uncover hard-to-find or intermittent issues
- **Load studies** – verify electrical system capacity before adding loads.



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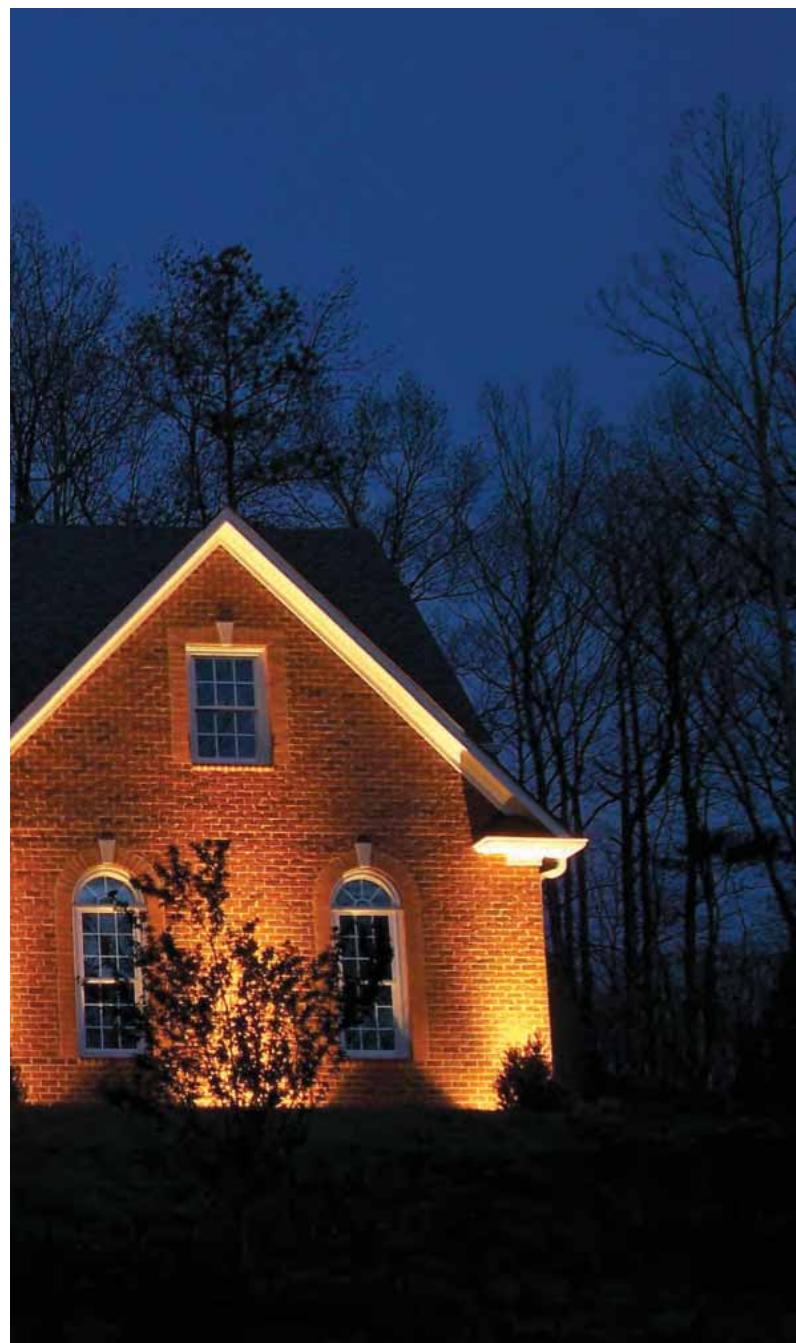
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Role Of LEDs In Landscape Lighting



Longevity is a basic criterion for choosing the kind of light in case of a landscape light – and LED light scores above the other sources of lights on this parameter...



Landscape Lighting is the use of outdoor lights to illuminate façade, garden, trees and water bodies of an area. A nicely lit landscape is very essential for the enhancement of security, beautification, entertainment and recreation of an area. Since LEDs are unidirectional sources of light, they play a very important role in landscape lighting.

A wide choice of colour temperatures and high CRI (Colour Rendering Index) make LEDs an ideal choice for landscape lighting. A wide choice of colour temperature allows the designer to play with the colour of light and bring out the real texture of the landscape and the façade, whereas a high CRI provides sharpness to the landscape. The choice of colour temperature (i.e., the shades of white coloured light) is narrower in LEDs – and only with LED lighting can one achieve a CRI Of as high as 95.

Modern day advancements in optics and plastic technology and their integration with LEDs have resulted in a perfect combination of opto-electronics. Another aspect of LEDs that scores above the conventional sources of light is that LEDs are more rugged in nature and non-filament source of light i.e., LEDs do not use any filaments and are less fragile in nature as compared to conventional source, so potting a waterproofing agent like epoxy or silicon on the light source is very easy and comparatively safer.

The small size of the light source in case of the LED makes it very easy to make efficient luminaries' in a compact size and, for example, making a linear wall washer for façade lighting or a fountain light to cover the fountain is only possible if the source of light is small and discrete – and can be connected in a parallel fashion.

Low voltage operation – The operating voltage of the LED is below 4V DC, unlike any other form of lighting, and to run it on 220V we generally make use of a SMPS (Switching Mode Power Supply) to bring down the voltage and convert AC to DC and in case of any form of outdoor lighting – especially any light that is in direct contact to water – it is always advisable to run it on a lower voltage direct current to avoid any fatalities in case of current leakage.



In case of conventional sources, we have to make use of special inverter circuits to step up the voltage and convert it to alternating current. This increases the cost of the luminaries', reduces the safety and cuts down life of the fixture.

On the other hand, LEDs are a much safer alternative that runs on a low voltage (by its property) and are very safe in its operation.

Low maintenance – The life of the light source in a garden light is very important owing to the basic fact that the location of a garden light generally speaking is in tricky areas, let's say for example, an underwater fountain light or an underwater burial installed in a swimming pool, is very difficult to replace – because it will need the entire pool to be emptied in order for it to be replaced. Or let's say for instance, a wall washer /flood light installed to highlight the façade of a building at a height of 60 feet would require a crane to replace the light; in most cases the cost of replacing the light is higher than the light itself.

Longevity is a basic criterion for choosing the kind of light in case of a Landscape Light – and LED light scores above the other sources of lights on this parameter.

Better and brighter Light – The key function of landscape lighting is security and beautification of an area. LEDs being the brightest form of light achieving tremendous efficiency of 170 to 180 Lumens per watt and delivers safe light like no other source.

Another feature of LED light that scores above conventional sources like metal halides and halogens is that LED lights are not prone to any burn outs or blasts at the light source due to short circuits or overheating conditions.

At maximum, the LED light fuses in case of any unfortunate incidents.

The CRI of LED lights is again highest known among the various sources, be it halogen /metal halides / fluorescent sources. Owing to its very small size, it can be very easily integrated with secondary lenses and optical reflectors, so the quality of light obtained from LEDs is also the highest, comparatively. Aesthetically speaking, by using LED lights the result generated will be the best.

Environment friendly - LEDs are mercury-free, and do not emit any UV or IR radiations, and are ROHS Compliant i.e., they are devoid of any harmful substances like mercury,



cadmium etc., unlike the other sources of light like metal halides that emit UV and have a high cadmium content, or fluorescent lights that have a lot of mercury or halogen lights that generate a lot of IR radiations contribute a lot in polluting the environment and global warming. Since landscape lights are installed near the trees/ in water and are close to nature, this gives all the more reason of choosing LED Lights over conventional sources. ■



Ankit Bajaj
Managing Partner of Noble Electricals
A Delhi based company involved in
manufacturing of LED lights...

灯都古镇会议展览中心 GUZHEN CONVENTION AND EXHIBITION CENTER



The Lighting Fair in the Lighting Capital of China

The 16th China (Guzhen) International Lighting Fair (GILF), which commenced at the Guzhen Convention and Exhibition Center on Oct 22, 2015 successfully concluded on Oct 26, 2015. Together with the fair, the First Guzhen Lighting Festival was held from October 21 to 27...



Guzhen; the beautifully conceived and designed, high profile town of China; is popularly called the Lighting Capital of China. The town hosts two editions of lighting fair every year: the Spring Edition and the Autumn Edition. The 16th China (Guzhen) International Lighting Fair (GILF), which commenced at the Guzhen Convention and Exhibition Center on Oct 22nd, 2015 successfully concluded on Oct 26th, 2015.

SPECIALITY OF THE EXHIBITION

The Guzhen lighting fair of this autumn was based on the abundant lighting industry resources of the lighting capital. It took the innovative exhibition mode of 'the exhibition linked to the shop' to realise a one-stop light-fixture purchasing and trading platform on a super-large scale of 700,000 square metres.

INAUGURATION AND THE EXHIBITION

The opening ceremony of this autumn's Guzhen lighting fair and the lighting cultural festival was held together with all kinds of talents on the spot really bustling. In short, the booths were distributed in the following way. Also, a brief statistical information on the exhibitors' actual geographical locations (towns from where they came to participate in the exhibition) is included below.

At the fair, the exhibition area of the main centre took up more than 30,000 square metres, of which 12,717 square metres were for 1,413 standard-sized booths.

Six hundred and seven outstanding exhibitors were gathered with a merchant attracting ratio as high as 100%.

Three hundred and ninety-eight companies participated in the fair, of which 127 were from outside the town.

One hundred and forty-one exhibitors were from outside the city but within the province and 48 from outside the province but within the country.

The area of the main hall covered over 30,000 sqm, attracting 616 distinguished enterprises.

PRODUCTS IN THE EXHIBITION

Various kinds of products covering the whole production chain both in the up-stream and down-stream, including commercial lighting, outdoor lighting, LED lighting and lighting accessories, were on display.

The whole new design was widely applied in the comprehensive product catalogues.

MAXIMISATION OF THE VALUE

The highlight for this year is overseas buyers' match-making service.

Before the fair, by reasonably arranging the meetings between exhibitors and overseas buyers from the organisers, this one-stop service quickly and effectively brought together buyers and suppliers to promote trade together and maximise the value of participation.

CONFERENCES AND FORUMS

This year, the 'Salon for global decorative lighting design masters' was held in the Star Alliance venue, where world's top experts gathered together. During the event days, many high-end conferences and forums were also held.



LIGHT FESTIVAL

The splendid activities of the light festival continued during the days. The music fountain taking the Roman column as an example, the six-Fang cloud/dragon luminous performance with its vivid style were shown in turns, attracting numerous visitors to stand still to enjoy the sight.

GUESTS AND VISITORS IN THE EVENT

Domestic and overseas guests in the light-texture industry gathered in China's lighting capital to enjoy the carnival of procurement and trade, exchange and jointly promote the healthy development of the Guzhen decorative lighting industry. Altogether, 234,373 visitors from home and abroad were attracted to this short 5-day exhibition. The main hall saw 68,194 visitors, including 3,419 from 112 countries and regions. The number of visitors had an increase of 20% over the number in 2014.

ACTIVITIES AT A GLANCE

With the participation of persons of authority in the lighting industry, there were plenty of meetings, forums and activities, such as 'Global Lighting Designer Salon,' '2015 China International Lighting Design Competition Nominee Works Comments,' 'The 12th China Lighting Capital Industry Summit Forum,' 'Award Presentation Ceremony of The 16th China (Guzhen) International Lighting Fair Exhibits Contest and 2015 China International Lighting Design Competition Awards,' etc. Experts and professional teams gathered to discuss market information, technology development and enterprise development approaches guiding the new fashions of the lighting industry.

ALONGSIDE THE TRADE FAIR

With the fair, the First Guzhen Lighting Festival was held from October 21 to 27. The fair and the festival constituted the most distinguished feature of 'Visiting the Exhibition during the day while enjoying the lighting at the night.' Based on the theme of 'Guzhen Dream, Zhongshan Dream and China Dream,' the lighting festival fully combined local lighting with technical and cultural elements to demonstrate lighting effects, a stunning nightscape and unique lighting charm, as well as organically integrating the colourful lighting theme culture with the lighting industry and touristic cultural resources of Guzhen Town to promote the industries of the town.

DATES FOR THE NEXT GILF

The 17th China (Guzhen) International Lighting Fair (Spring Edition) is under close preparation, and is planned for March 18 to 21, 2016 in the Guzhen Convention and Exhibition Centre. Hopefully, none of us will fail to meet again at Guzhen to witness more advanced and amazing technologies and their applications. ■



A Pre-Show To Make You Know...

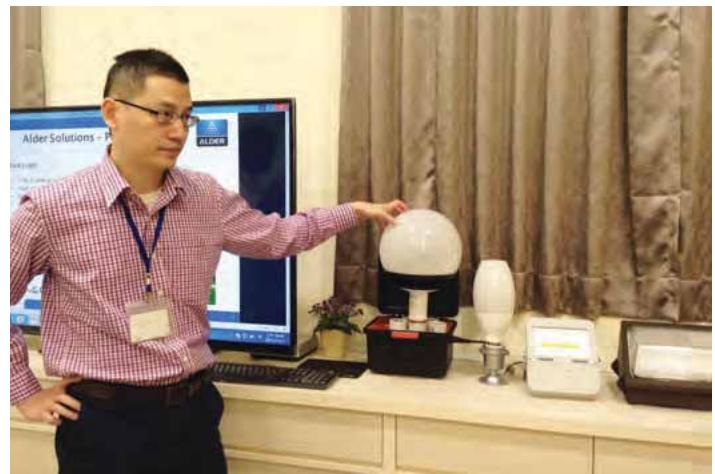
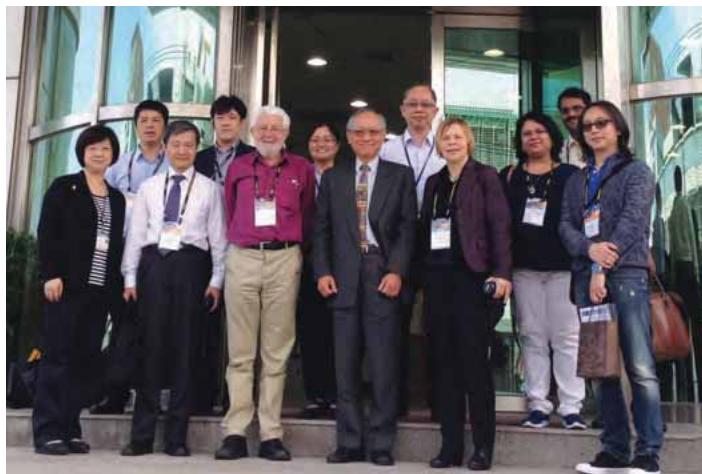
The pre-show to '2016 Taiwan International Lighting Show' was an effective platform to disseminate new ideas of the innovative Taiwan-based lighting companies...

A pre-show; to the 2016 Taiwan International Lighting Show that will be held at Taipei from April 13 to 16, 2016; was conducted in Taipei from November 16 to 20 (2015). A number of lighting companies assembled there with their latest products to make the attendees (of the actual trade show) aware of the latest technologies, applications, efficacies and their advantages. The pre-show was mainly targeted to make the media people better understand the lighting products and accessories that will be on display in the 2016 Taiwan International Lighting Show. Also, there was an effort to make the actual show's business platform stronger. In the event some of the participant companies demonstrated their latest innovations.

Alder Optomechanical Corp., a German-Taiwanese company (since 2003), was present in the pre-show. The company combines the state-of-the-art expertise in technological development and industrial design. Almost all kinds of lighting products are available with Alder, which include High Bay Light, Hall Light, Down Light, Mini Wall

Pack, Par Light, MR 16, Linear Lighting, Street light, ML Bulb, Park Light, Work Lamp and Wall Pack. The company is looking at global expansion. Inviting interested business people worldwide, CK Lee, Chairman & CEO, Alder Optomechanical Corp., says, "Unite with us and present ALDER's technology to your local market and join our sales team on the road to success – and enjoy the achievement by gaining profitable income."

Shinyu Light Co. Ltd. (since 2010), specialises in the R&D, design, manufacture and branding of a wide variety of energy-saving and environmental-friendly LED lighting fixtures. The company has developed thermal technology in cooperation with the National Tsing Hua University. Also, they are entrusted with the Industrial Technology Research Institute and technology licensing for glass lens optical design. Shinyu presents LED-based anti-explosive Light, which incorporates glass lens and aluminium alloy housing that work safely – and also is durable under various conditions. They also specialise in COB (Chips on Board) lights, and their R&D





team has come out with innovative cooling solutions. They also have developed high power LEDs which are bigger in size than the ordinary LEDs.

Zhao-Neng Technology Co., Ltd. and GP Technology Co., Ltd. together presented their products. GP Technology is in the market with products like Waterproof Light Bar, 5W Bulb, LED Downlight, LED Colour Lighting... GP Technology was established in 2008, the group owns experiences of LED field, especially emphasised on LED development of components and innovation.

With the professional knowledge of LED production, they provide high-quality goods to customers from worldwide. This company has speedily expanded its market with the spirits of 'cooperation' and 'association'. They focus on energy-saving product combination, their development and sales, in order to contribute and approach global green environment goal.

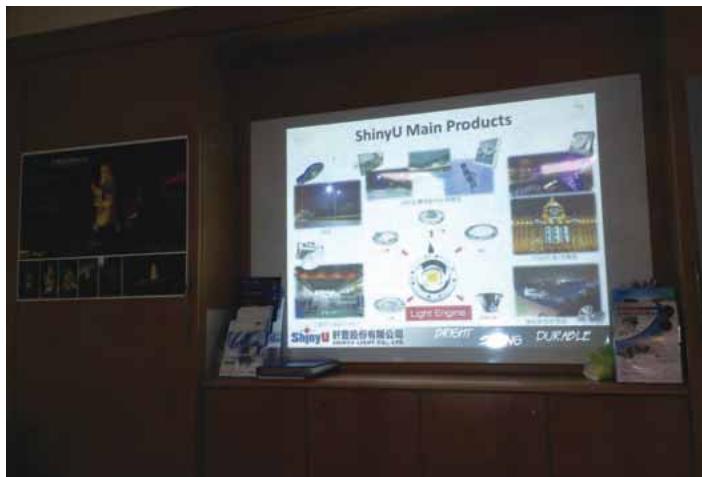
Ledlink Optics is an expert in designing and manufacturing optics for the emerging solid state lighting companies such as Cree, Edison, Lumileds, Nichia, Osram, Samsung, Seoul and

other LED manufacturers. Their company mission is to help their customers optimise optics performance in creating solid state lighting products. They provide lenses in a wide variety of package with numerous beam pattern options and sizes, such as residential lighting, commercial lighting, street lighting or architectural lighting. They have core competence in the areas of in house optical design and simulation, in house mould design and tooling, in house manufacture, customised MC PCB, Modulised solution with lens, heatsink, MCPCB, ODM & OEM (excluding power and driver).

There were also many other companies like Epoch Chemtronics Corp., Rainbow Light Technology Co. Ltd., Anteya Technology Corp., TYC Brother Industrial Co. Ltd.

Epoch Chemtronics Corp., founded in 1997, is a company dedicated to small and medium-sized backlight module production for a wide range of applications – such as GPS, smart phones, tablets and industrial computers. They provide exceptional integrated services from product development to manufacturing and quality control.





Rainbow Light Technology Co. Ltd. offers the Rainbow-Light Micro-Spectrometer, which is the company's own brand product, developed by the MEMS technology, with the features of small size, low cost, high resolution, vibration resistance and drop-proofness. This particularly fits the development of a portable device that requires a spectrometer. According to the company, it has broken through the application restrictions of spectrometers.

Anteya Technology Corp., offers 3-5WLED, 5W E26 LED, Single/Multi Colour 5W E26 LED lamp; 3W High Brightness LED flashlight etc. The company will soon roll out 3WLED,

5WLED, HBLED, Single Colour/Multi Colour LED light bar in form of W 40mm x H 20mm x L 50-1500mm aluminium bar.

TYC Brother Industrial Co. Ltd. works on a mission to provide superior, safe and more competitive automotive lighting and high performance luminaire products. The company offers variety of lighting products including Ceiling / Pendant, Office Luminaire, Downlight and Track Light. Also, they have LED and HID Street luminaire. TYC Group (China) is also into automotive lighting.

Overall the pre-show was quite a successful event considering its purpose to give a preview of the technologies that are being brought to the '2016 Taiwan International Lighting Show.'

It also helped enthusiast visitors and media to grab the threads of the new innovative ideas. It was also possible to conceive new application ideas through discussion and Question & Answer sessions.

WeMo offers LED starter set, smart led bulbs



WeMo, the home automation ecosystem created by Belkin International, WeMo LED Starter Set and WeMo Smart LED Bulbs. They allow you to control, schedule, customise and dim household lighting from anywhere (as you prefer) using the WeMo app on a smartphone or tablet.

"More than any other element in the connected home, smart lighting is both functional and emotional. It's completely utilitarian and allows people to function in the dark, but at the same time can completely alter the mood and feeling of a room with the flick of a switch," said Ohad Zeira, Director, Product Development, WeMo.

"The new WeMo Smart LED Bulbs not only give consumers additional options for controlling and customising household lighting, but also help position WeMo as a major player in the smart lighting market," he added. As easy as replacing a standard light bulb, the WeMo Smart LED Bulbs work with the WeMo Link to connect to a home's Wi-Fi network and are controlled via the award-winning WeMo app. ■

Website:
www.belkin.com

Hubbell Building Automation offers NX room controller



Hubbell Building Automation's NX Room Controller is a self contained intelligent power pack that provides stand-alone room level control meeting energy code

requirements. It contains one or two independently controlled relays that can alternately be configured for smart bi-level level switching.

Dimming versions are available that provide one or two 0 to 10V DC control signal outputs for full range control of dimmable ballasts and LED drivers.

The features Smart PORT technology that provides auto configuration of occupancy sensors and manual control switches. When devices are

plugged into the Smart PORT, the controller automatically and intelligently responds to the devices to provide the most energy efficient operation. They have: •Single or dual relay versions for On /Off or High/Low control; •Optional 0 to 10V interface for full range dimming control •Override push button and status LED per relay/dimmer. ■

Website:
www.hubbell-automation.com

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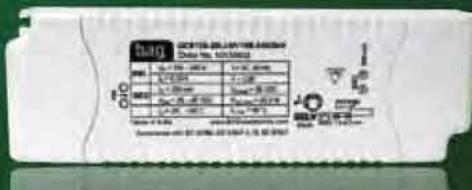
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Linear - UCS Series

Sr. No.	Features	PCS	UCS
1	Non-dimmable 1-channel ECG for constant current operation of LED modules	YES	YES
2	ECG extensively protected against abnormal operating conditions at the output e.g. short-circuit, open circuit or overload	YES	YES
3	Certified as thermally protected device	YES	YES
4	Conformance with international regulations, regarding safety and operation	YES	YES
5	Surge protection upto 3kV	YES	YES
6	Mains overvoltage protection upto 320 VAC	YES	YES
7	Degree of protection-IP 20	YES	YES
8	Total harmonic distortion (THD)- <20%	YES	YES

Product Variant

Sr. No.	PCS	UCS
1	28W, 700mA	20W, 350mA
2	32W, 800mA	20W, 500mA
3	36W, 900mA	20W, 700mA
4	40W, 1000mA	35W, 700mA

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