

IllumiNation

OCT - DEC 2021

THE LIGHTING MAGAZINE BY ELCOMA

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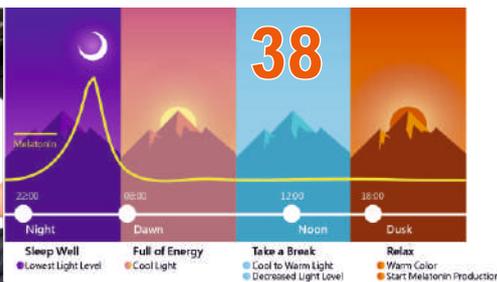
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Shyam Sujan
 Electric Lamp and Component Manufacturers' Association of India
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 Tel: +91-11-41556644/46604947

EDITOR

Shyam Sujan,
 Secretary General, ELCOMA

EDITORIAL BOARD

Sudeshna Mukhopadhyay
 Amal Sengupta
 Krishan Sujan
 Natasha Tandon
 Jayaganesan K
 Pruthwiraj Lenka
 Subrata Sen

EDITORIAL CONTACT

info@elcomaindia.com

MARKETING AND ADVERTISEMENT CONTACT

Amal Sengupta
 amalsengupta@elcomaindia.com

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Lighting Technology for Agriculture Development

Modern farming and agricultural operations work differently than twenty or thirty years ago. The advancements in technology, farming equipment, devices, machines and information technology have created new interest in this sector. The Prime Minister recently announced an additional financial outlay for the farming sector in India. Today's agriculture routinely uses sophisticated technologies such as robots, temperature and moisture sensors, aerial imaging and GPS technology. Most of these are being introduced in India also. These advanced devices and precision agriculture and robotic systems allow farming to be more profitable, efficient, safer and more environmentally friendly. The productivity has also increased manifold.

Farmers are no longer restricted to application and use of traditional systems of farming and localization of produce. In the new world it is not necessary that only Nagpur can produce oranges or only Nasik can produce onions or only Pampore in Kashmir can produce Saffron. All this is set to completely change with the help of Lighting technology. Research has shown that each plant requires a different spectrum of light to grow better and now we have been able to use LED lighting to isolate and apply in the areas for special requirement of those plants.

Starting from this issue of IllumiNation, we are going to be highlighting LED Lighting technology for agriculture use. ELCOMA also proposes to hold seminars on this technology for closely understanding this technology.

ELCOMA has been in touch with Ministry of Agriculture to make this technology available on a larger scale. A Centre of Excellence will also need to be set up for demonstration and experiments. We are also planning to tie up with few Agriculture Universities for creating training courses specifically for LED lighting technology in Agriculture sector.

We hope that this new application of LED lighting will ignite a lot of interest in our industry and provide good business opportunities for the Lighting Industry in India.

I would also like to take this opportunity to wish our readers on the occasion of Diwali and wish everyone all the best for this festive season.

Best wishes

A handwritten signature in black ink that reads "Shyam Sujan".

SHYAM SUJAN

Secretary General

Electric Lamp and Component Manufacturers Association of India (ELCOMA)



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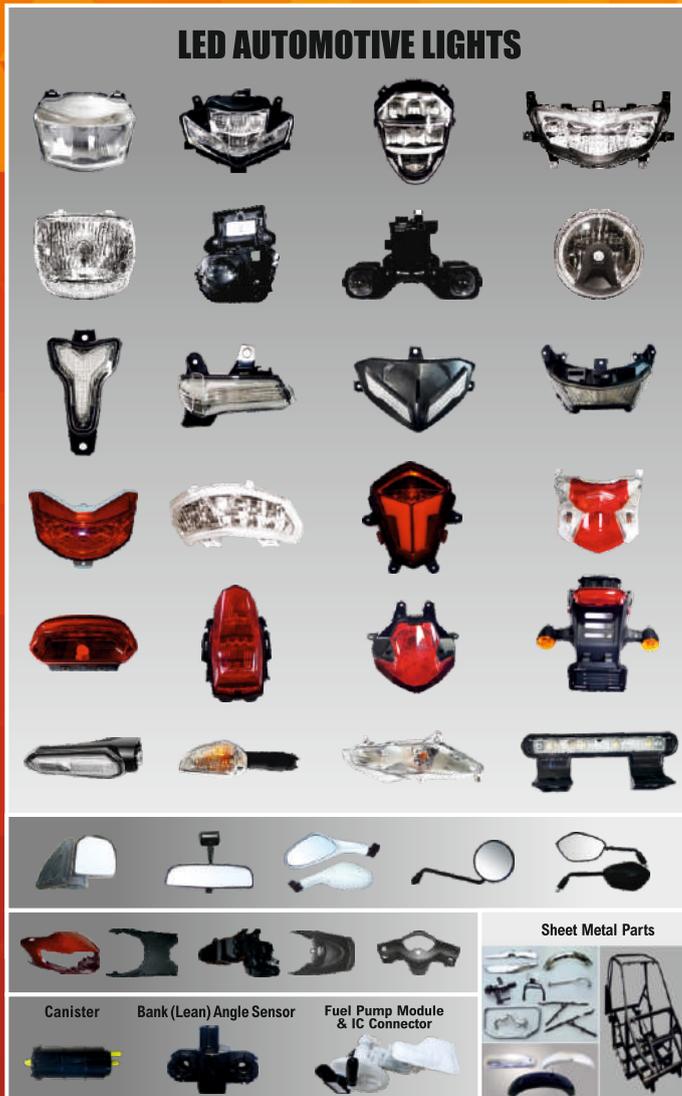


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ELCOMA's Vision of "AtmaNirbhar"

Our Prime Minister Shri Narendra Modi recently announced a ₹20 lakh crore economic package under the 'AatmaNirbhar Bharat Abhiyaan', to help the country emerge stronger in the aftermath of the COVID-19 crisis and at the same time help our country become more self-reliant in various industries. Promoting manufacturing in the country is one such initiative undertaken by the Indian government in this program.

For more than 70 years now, ELCOMA members, who constitute the Indian Lighting Industry, have been focused on making almost all their products in India. In the last few years, due to the sudden increase in demand of LED products, the Indian Lighting Industry has been importing components and assembling lighting products in India. However, with its historical background of high-quality local manufacturing, the Indian Lighting Industry is once again ready to take up the challenge of making in India.

ELCOMA has prepared a Vision 2024 plan which envisages that in coming years, at least 70-80% of LED lighting components will be manufactured with the country. Additionally, the industry is also planning to export about 40% of its combined lighting turnover to the world by 2024.

The five pillars of a self-reliant India that our honourable Prime Minister has been stressing on will herald bold reforms across various sectors and will drive the country's push towards self-reliance. With the AatmaNirbhar Bharat Abhiyaan, our Prime Minister is hoping to give our economy not just an incremental but a quantum leap, so that we can convert the current adversity into an advantage. We need to modernize our manufacturing set up which will in turn also revamp our country's infrastructure and pave the way for a modern India.

The Indian Lighting Industry has already created focused programs to modify all lighting standards according to Indian conditions and bring in new technologies. Our energy efficient LED products have already helped the country save more than 36,000 MW power between 2014 to 2020 and we will continue to increase these savings by bringing in newer and even more energy-efficient technologies. Even before the AatmaNirbhar program was notified, ELCOMA and its members were already geared up with various programs to support this vision.

Many ELCOMA members are already supporting this venture and have offered to make components and final products in India. The Indian government's Production Linked Incentive program will also ensure more participation in local manufacturing in India. As far as LED Chip and packaging is concerned, Tata and DRDO have also recently announced plans to study the feasibility of making these components in India.

Over the next three to four years, I am confident that we will witness the emergence of a new lighting industry in India that is vibrant, energetic and full of new energy.

Warm Regards,

SUMIT PADMAKAR JOSHI
President, ELCOMA



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Growing from Strength to Strength

IllumiNation in conversation with Mr Nirupam Sahay, Executive Director & Chief Executive Officer, Surya Lighting & Consumer Durables on what it takes to succeed at the highest level

You have led large businesses across diverse industries like Lighting, Financial Services, Consumer Durables and Paints. Please take us through your professional journey so far.

I joined Asian Paints from campus. I was there for close to 10 years. The first five years were in Sales, and I worked across the country, in Bangalore, Jaipur, Chandigarh, Ghaziabad and Ahmedabad, which was great since I got to know diverse Indian markets and consumers very well. It's a great company, which gives you independence at a very young age, and has a great culture.

Then, I moved to Marketing, where I was initially a Group Brand Manager handling the portfolio of wall finishes, wood finishes and rural marketing. Within a year, I became the Marketing Manager for the entire Decorative Business. We did a lot of exciting things in that period, including relaunching the brand, launching the 'Har Ghar Kuch Kehta Hai' campaign, launching Asian Paints Colour Worlds etc.

Then, I moved to Whirlpool, where I had a dual role. I was heading Marketing Services, which included advertising, media, PR, etc. for the entire company, and was also the Business Head for ACs and Microwaves. I was responsible for the launch of these new categories for Whirlpool in India.

After that, I joined GE Capital, and worked as the Chief Marketing Officer for SBI Card, a JV between GE Capital and SBI. I worked for four years as CMO, and then headed Strategy and Business Development for a year. In that period, we grew from being the No. 5 credit card player to becoming the No. 2 player.

In 2010, I joined Philips Lighting, Indian Subcontinent as the Chief Marketing Officer and Business Head, Lamps, and then was promoted as CEO within a year. We were the fastest growing market for Philips Lighting globally in that period, and improved profitability and market share substantially as well. In 2014, I moved to Hong Kong as Global Business Leader, Consumer Lamps. This role exposed me to the diverse global markets, which I really enjoyed. We again gained market share and improved profitability in the 5+ years that I handled the role.

I came back to India in 2020 and took up the role of Executive Director and CEO of the Lighting and Consumer Durables business of Surya Roshni. It was a perfect fit due to my previous experience. I look forward to accelerating sales growth, increasing the profitability and building the brand. We have a very exciting journey ahead.

You have come to Surya at a time when the entire Lighting industry is reinventing itself - focusing on manufacturing in India, planning for exports and supporting government's various schemes like AtmaNirbhar and PLI. What are Surya's plans in this context?

Surya is a proud Indian company, with extensive presence across the length and breadth of India, including semi-urban and rural India. We are proud to have 2 plants, in Kashipur (Uttarakhand) and Malanpur (Madhya Pradesh), as well a full-fledged Surya Technology & Innovation Centre in Noida. We plan to

Mr. Nirupam Sahay is the Executive Director & CEO, Surya Lighting & Consumer Durables. He has over 27 years of experience with the best brands like Surya, Philips Lighting, GE Capital-SBI Card, Whirlpool and Asian Paints. Besides having served as Senior Vice President & Global Business Leader, Consumer Lamps in Philips Lighting and President & CEO, Philips Lighting, Indian Subcontinent, he has also served as the President of ELCOMA. An alumnus of St. Stephen's College, Delhi, Mr. Sahay completed his MBA from NMIMS, Mumbai and did an Advanced Management Program at The Wharton School.

continue to manufacture in India, for India and the world, and are going to be participating fully in the PLI Scheme for LED Lighting.

As you are aware, ELCOMA has prepared a Vision 2024 program to enable Indian Manufacturers to make up to 80% components locally and Export up to 40% of production by 2024. With your wide exposure to international businesses, what suggestions would you want to make to ELCOMA members and Indian manufacturing in general to achieve this mission?

A relentless focus on delivering high quality and low costs is critical for the Indian lighting industry to be successful in increasing Exports. Indian companies need to build scale, and the PLI scheme will enable more companies to increase backward integration, build scale and capabilities for Exports.

What kind of product portfolios would you develop Surya's lighting business on, in the coming few years?

LED is clearly the future of Lighting, so LED products and Smart Lighting will be key pillars for us in both the Consumer and Professional segments.

“Indian companies need to build scale, and the PLI scheme will enable more companies to increase backward integration, build scale and capabilities for Exports”

CAPTAIN SPEAKS

We are also growing our Consumer Durables (Fans & Home Appliances) business very rapidly.

Where do you think IoT and Smart lighting is going to be a few years from now?

I believe that there will be exponential growth in Smart Lighting in India over the next 5 years. We have a very low base, but a very strong eco-system for hardware & software, which should enable us as an industry to build scale quickly.

COVID 19 has played havoc with the global economies that has not only

“ I believe that the economy will rebound well over the coming year – obviously hoping that there is no serious third or fourth wave in the coming months. The Lighting industry has already seen a good rebound after the first and second waves, and there is strong momentum building up for the year ahead”

affected most businesses but has rendered many workers unemployed. How do you think the Indian economy is positioned to grow after the pandemic and how is the lighting business in India going to look in the future?

I am cautiously optimistic on the Indian economy. I believe that the economy will rebound well over the coming year – obviously hoping that there is no serious third or fourth wave in the coming months. The Lighting industry has already seen a good rebound after the first and second waves, and there is strong momentum building up for the year ahead.

ELCOMA is proposing to set up a Centre of Excellence (COE) on lighting in the future to promote R&D in lighting. How do you think that the Indian Lighting Industry would be best served through this medium?

The COE can be leveraged particularly by the smaller companies, who don't have the resources to have full-fledged R&D facilities. I think it is a great initiative by ELCOMA, which will be supported whole heartedly by the concerned Government departments.

IN A LIGHTER VEIN

Favourite Food : Indian and Chinese

Favorite Holiday : Goa and London Destination

Favourite Family Activities : Traveling, Eating Out And Watching Movies

Which sports do you follow / enjoy? Cricket, Tennis And Football

Favourite Filmstar? : Amitabh Bachchan

How do you spend your free time?

I love reading, listening to music, quizzing (something that I have been doing since my school days), walking, and spending time with my family

Which is your favourite book or author?

“To Kill a Mockingbird” by E. Harper Lee. It's a brilliantly written novel, with very well-etched characters

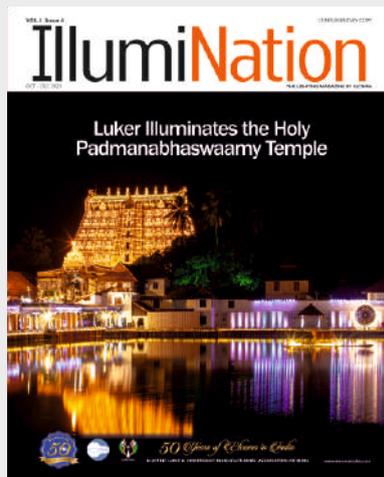
Is there a movie that left a big impression on you? A movie that you can watch repeatedly?

“Jaane bhi do Yaaro” is my all-time favourite, which I must have seen 20 times – I still laugh as much every time I see it

Who is your greatest inspiration?

My parents – for being great role models, and showing me the power of decency, affection and humility

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Championing Energy Efficiency in India



You recently stepped down as the EVP, EESL group in a decision that has come as surprise to many. Would you care to let us know the prime driver for such a decision and what are your plans for the immediate future?

It has been brewing a while. I have been with EESL for eight and half years. The structure has changed where my role had become more of a custodian. I was not looking at day-to-day affairs. I have been discussing this with promoters and the ministry that I really don't need to be here. I built it up, found new leadership and that's it. It is professional decision on both sides. I didn't see any value that I would be creating any longer. We have operating companies CESL and Intellismart with good MDs who are doing good work and so my role was diminished.

My role largely was coordinating among the group companies and ensure they are aligned with each other and if there are

inter-company issues, they were referred to me. So I was not looking after day-to-day affairs for almost for a year now which is something that I didn't want to do. I did not want to retire so early, so this decision was a very unanimous one and everybody was comfortable.

I have been regularly talking with the ministry on this. They are happy with the way the group is working including on large important programs like smart meters, Fame-II, etc. Its fair that I, having worked for so long take a break and it is very nice of them (management) that they understood my decision.

I am yet to firm up future plans but would definitely like to remain connected with the sector.

An Indian Revenue Service officer of 1992 batch, you have worked in various capacities in the Income Tax Department, the Ministry of Power, and the Bureau of Energy Efficiency (BEE) prior to leading EESL. All

these fields look dynamic and different. What is your secret in successfully fitting into all different profiles?

As civil servants we are trained to always look at learning new things and bringing them in for implementation to continuously improve ourselves through learning. If one is positive and is willing to learn and is determined to improve offerings, it is not difficult to deliver results in seemingly different sectors. Application of basic common sense, determination to succeed and positivity makes it easy.

Request you to tell us a little about your stint in the Income tax department where you had been part of the enforcement wing conducting search and seizure operations and were also appointed as first officer of the tax department in India to levy tax on national political parties.

The stint in Income Tax was very rewarding and a great learning process. I was the officer in-charge for assessment of cases of all National Political Parties in mid-90s which was a Supreme Court monitored investigation. I applied law in an unbiased and transparent manner and found discrepancies in two major political parties and levied tax on them. As my actions were in accordance with law and transparent, I did not face any hardship or pressure and the judgement was, after almost 20 years, upheld by the Hon'ble Supreme Court. On enforcement side, I conducted Department's largest search operation (at that time in 2001) on a group that had evaded almost Rs. 2500 crore of income. The operations were conducted at 110 places in 15 cities simultaneously and resulted in the desired outcome. It became a multi-agency investigation with CBI and ED



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joining in.

As Secretary of the Bureau of Energy Efficiency (BEE) from 2007 to 2010, you championed Demand Side Programs under CDM (Clean Development Mechanism) projects on efficient lighting. What challenges did you face from the government and the Lighting Industry and how did you overcome them?

The Bachat Lamp Yojana (BLY) structured as a unique collaborative PPP mechanism under carbon finance was implemented. The scheme had full support from the Government and it was formally launched by the then Hon'ble Power Minister. Ministry of Power also allocated funds for facilitating private sector participation in the program and the role of BEE was that of the Program Manager. Industry too was very supportive and almost 3 crore CFLs were distributed – the scheme closed due to collapse of carbon markets.

At BEE, you created several bilateral projects on energy efficiency with Japan, Germany & France during a 2-year deputation to Bangkok with United Nations Environment Program. How did the interaction with these global associations help in designing and implementing an India specific energy efficient LED lamps program?

BLY was created with support from Germany and later on the World Bank. Several other agencies from Japan and UK too added value in the design itself of the mechanism. My stint at Bangkok in UNEP too added to the same as working with several countries in Asia-Pacific region helped me to make the program better. The LED program was effectively the remodelled BLY with financial resources coming out of the Utility as a Demand Side Management (DSM) resource acquisition. This made the program attractive as consumers were able to avail of LEDs at Rs.10 and Utilities paid EESL from monetised

energy savings.

The ELCOMA Vision 2020 document for promoting LED Lighting in India and the subsequent UJALA program that was led by EESL changed the Lighting Industry in India. We know that the Indian Lighting Industry was sceptical initially of achieving the aggressive price and manufacturing targets set by EESL. Take us through the thought process and the program achievements from your perspective.

Ministry of Power, Government of India, directed Energy Efficiency Services Limited (EESL) in 2014, a public sector entity under its administrative control, to take steps to scale up the use of LEDs in India. The retail price of LEDs at that time was about INR 450-500 each in comparison with CFL (at INR 100-150) and ICLs (at INR 10-15) that was limiting its use. The share of LEDs in the lighting market was less than 1% in the year 2013-14 and 77 crore ICLs and about 30 crore CFLs were sold. EESL, taking note of the previous measures taken by Bureau of Energy Efficiency (BEE) and critically analysing the barriers and challenges, designed a new business model called PAY-AS-YOU-SAVE (PAYS) that:

- Provided LED bulbs to households at INR 10 each, which is the same cost as ICLs, thereby overcoming the high cost barrier.
- The balance amount was included in consumer's electricity bill as Equated Monthly Instalment (EMI) over a 5-10 years period based on the cost of LED procured. INR 10 per month was added to the bills which is less than the monthly energy savings by use of LEDs as compared to CFLs/ ICLs
- During the period of EMI, all failures of LEDs was warranted and defective LEDs were replaced
- An information and outreach program was launched to spread

awareness amongst consumers and other stakeholders. The first project was implemented in 2014 in UT of Puducherry covering 2 lakh households by selling 6 lakh LEDs. The procured price of LEDs was INR 310 each and consumers paid it in monthly installment of Rs. 10 for 8 years

From pilot project in Puducherry to the World's largest LED program

The success of the first program in Puducherry brought to the core the fact that Distribution Companies (DISCOMs) were able to reduce their peak demand without having capital to invest. The PAYS model provided an innovative solution to consumers as well as attracted other DISCOMs and states to join the program.

Andhra Pradesh became the next state to implement in 4 Districts initially with an overall coverage of 60 lakh LEDs. The procurement of 60 lakh LEDs reduced the cost to INR 204 and the PAYS model was implemented with EMI spread over 5 years. The success of the program and the simplicity of the PAYS model attracted other states like Delhi & Rajasthan while Andhra Pradesh decided to implement it in all 11 districts.

This led to Ministry of Power requesting the Hon'ble Prime Minister to launch the National LED program on 5th of January, 2015. The encouragement by the Hon'ble Prime Minister took UJALA to the second stage where EESL, with the support of Ministry of Power, initiated efforts to engage with more states and DISCOMs to join as there was no financial implications over them. The policy makers in states were informed about the benefits of the program to consumers as well as management of peak load. EESL started to aggregate demand and issue bulk procurement. It also ramped up distribution in all states. The selling counters were set up where the consumer footfalls were high, like the billing centres of DISCOMs, other

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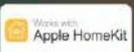
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Technology

#NoBlueLightHazard

areas that were close to consumer's door-steps. Local level awareness programs were launched informing consumers of the benefits of LEDs and telling them the place in their neighborhood where the bulbs were being sold. A public UJALA dashboard was created that captured the sale of every bulb at each counter and provided exact location of the counter using Google maps. The dashboard used a colour code where states that have joined the program were coloured blue the others being white. This also increased the pressure on the policy makers to join the program.

The combination of aggregation, bulk procurement and scaling up of sale of UJALA bulbs resulted in dramatic drop in prices of LEDs by at least 90%.

EESL has also successfully implemented the SLNP program where millions of streetlights have been provided to municipalities on an ESCO model. Would you like to tell us more about this program and its current status.

The ESCO business model was used to scale up street light replacement in the country. As on date, 1.2 crore streetlights have been replaced. The value proposition is

- Pay As You Save (PAYS) business model
- No upfront investment- Re-payment from savings – performance guaranteed and failures warranted
- Barriers of high first cost and comparative end use overcome
- Incentives for all stakeholders –aggregation of demand to leverage economies to scale
- EESL has enrolled 1500 ULBs and work is completed
- Entire upfront investment by EESL and repayment through deemed savings model
- 7 year contracts with municipalities

guaranteeing minimum energy saving (of typically 50%) and free maintenance of lights.

EESL is engaging the states to replace all left out street lights with LEDs and has also initiated work in lighting up rural areas in AP, Telangana, Jharkhand and UP.

EESL has helped India save millions of rupees in power generation and transmission by promoting and executing energy efficiency programs supported by the Indian Lighting Industry that ramped up to meet EESL's expectations. What is EESL's next big project that is going to change the Indian landscape?

The focus now is on clean energy aligned with the Government vision. There are three elements of this vision

Solarisation of Agriculture –

Agriculture consumption in India is about 20% of the total consumption and is free in most of the states. An estimated amount of over Rs. 1.1 lakh crore goes as subsidies from state governments. EESL is taking up implementation of PM-KUSUM scheme in states where small decentralized solar plants are being set up with the objective of providing low-cost green energy for agriculture. The program will reduce subsidy burden on states while at the same time increasing renewables.

Smart Meters – EESL is implementing smart meters program in 7 states and UTs with the objective of improving billing and collection. This too is aligned with the Ministry of Power's scheme to enhance the financial viability of DISCOMs and increase billing efficiency from the present levels of 83% to over 98% leading to increase revenues to DISCOM of more than Rs. 1 lakh crore annually.

Electronic Vehicles or EVs – EESL has pioneered the EV induction in India starting with 4-wheelers in Government Departments. It has now been mandated

to deploy 3 lakh electric 4-wheelers and almost 7000 electric buses in the country to stimulate the adoption of EVs in a big way.

EESL recently launched a new program to supply LED Lamps to BPL Households at Rs. 10 each. How are you able to manage this price and what is the key to the success of this program?

EESL is, through its 100% owned subsidiary Convergence Energy Services Ltd (CESL), is implementing the Gram Ujala program which is similar to BLY. The key difference is that only rural households are eligible and LEDs are provided at Rs. 10 each as replacement to ICLs. So far the program is being implemented in 2 districts and more than 23 lakh LED lamps have been distributed. The program is based on carbon revenues and will be scaled up in other areas once the tie up of carbon finance is finalized by CESL.

IN A LIGHTER VEIN

Favourite Food : Thai

Favorite Holiday : London Destination

Favourite Family Activities : Cooking and being with family

Which sports do you follow / enjoy? : Cricket, Golf and Tennis

Favourite Filmstar? : Amitabh Bachchan

How do you spend your idle time?
I play tennis, listen to music and write.

Which is your favourite book or author?
Jared Diamond, Collapse

Is there a movie that left a big impression on you? A movie that you can watch repeatedly?
Anand – a movie that showed how to live in death.

Who is your greatest inspiration?
My grandfather and Mother

INTERVIEWED BY ILLUMINATION EDITORIAL TEAM





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OSRAM



Luker Lights up the Holy Shrine of Padmanabhaswamy Temple



Luker provides lighting to the Padmanabhaswamy Temple , in Thiruvananthapuram which is supposedly the richest temple in the world.



The Padmanabhaswamy Temple is a Hindu temple, located in Kerala's state capital Thiruvananthapuram where the presiding deity is Vishnu. The idol is enshrined in the "Anantha Shayana" posture, the eternal yogic sleep on the infinite serpent Adi Shesha. Padmanabhaswamy is the tutelary deity of the royal family of Travancore. The 18 feet long idol is covered with gold and invaluable stones and Anantha with silver plates. The temple, with an

estimated value close to a trillion US dollars is the wealthiest place of worship in the world and is storehouse of monumental and priceless treasures. This abode of Vishnu is built in an intricate fusion of the Chera style and the Dravidian style of architecture, featuring high walls, and a 16th-century Gopura. While the Ananthapura temple in Kumbla is considered the original seat of the deity ("Moolasthanam"), architecturally to some extent, this temple is a replica of the Adikesava

Perumal temple in Thiruvattar. The temple is one of the 108 principal Divya Desams ("Holy Abodes") in Vaishnavism and is glorified in the Divya Prabhandam. The name of the city of Thiruvananthapuram in Malayalam translates to "The City of Lord Ananta" (City of the Divine Serpent), referring to the deity of the Padmanabhaswamy temple. Although records for this shrine date back to the 10th century, the temple was wholly rebuilt at the orders of Marthanda



Varma. The cult of this form of Vishnu was central to the Travancore kings, and the monument continues to be managed by a descendant of the royal family. This figure still leads the procession during the Arat festival in March-April, when the image of Padmanabha is carried to Shanmuga beach, to be ritually bathed in the ocean.

The origin of the Temple of Sree Padmanabhaswamy is lost in antiquity and it has been referred to in Epics and

Puranas. Some well-known scholars, writers and historians, like the late Dr L. A. Ravi Varma of Travancore, have expressed the view that this Temple was established on the first day of Kali Yuga (which is over 5000 years ago).

Luker used various types of luminaires to light up the temple. 1.5 kilometers (1500 mtr) of Surface profiles and 18W Strip Lights were used for the Seeveluipura and Kulasekhara Mandapam. Over 500 numbers of 4W

Candle lamps were installed at Seevelipura and East Entrance. Outdoor Strip Lights were also used to highlight the Thiruvambadi Sreekrishnan Temple Mandapam. The East Corridor and Nadakashala were illuminated using 36W double tubes as well as 10W, 20W, 30W and 50W floodlights. 100W and 200W Floodlights in warm white CCT were used for the for Gopuram Lights and for supplementing the existing lights for the Maun Gopuram. In addition to these, Luker used several numbers of Spotlights and Highbay fixtures for the lighting of the Dwarapalakas and the Valia Balikkal area.

AUTHOR : LUKER ELECTRIC TECHNOLOGIES PVT. LTD.

Views expressed in this article are those of the contributors and do not necessarily reflect those of the editors or publishers



Lighting up a sustainable planet - A look at how LED Technology will change Agriculture of the Future

A look at how Specialized LED Lighting in Agriculture is going to change the world of tomorrow



Increasing population numbers pose a significant threat to global food security. By 2050, there will be another two billion people on the planet, resulting in a 70% increase in demand for food. To meet this growing demand for food, we will need to design newer and more sustainable agricultural methods, other than rural farming, which is very water intensive and places immense stress on our water table and land resources. Using specialized LED lights in agriculture is one such way to

increase production without driving up usage of natural resources.

Signify has developed specialized agricultural lighting applications to help feed this growing population in a more sustainable way. The broad category of “agriculture” includes lighting to nourish growth and development of food crops (horticulture), animals and aquatic production.

HORTICULTURAL LIGHTING FOR INDOOR AGRICULTURE

Indoor farms use less energy, water and land as compared to traditional farming methods and will become a big part of our future food ecosystem. Signify aims to provide science-based solutions for the lighting needs of indoor agriculture. Signify's horticulture LEDs deliver light spectrums that are specifically tailored to optimize growth for different plants. These horticulture LEDs are also 40% more energy efficient as compared to traditional lighting and emit considerably less radiant heat. Low heat



radiation allows growers to separately manage two important crop inputs – heat and light – thereby enabling complete control over the climate in an indoor farm. Overall, the tailor-made light recipes contribute to predictable growth, better harvests, and higher quality yield.

Signify has also developed the Philips GrowWise Control System, which enables growers to create custom 'light recipes' that gives them full control over the outcome of the crop's quality. Different plants have different lighting needs at different times, and the system allows growers flexibility in luminosity and colour to meet the needs of the plant's different growth phases – it also works seamlessly with other climate

management systems.

SUSTAINABLE LIGHTING FOR LIVESTOCK

A lot of animals and humans see the world differently, which can be attributed to the difference in their natural habitats. For years, lighting suitable for humans has been used for rearing animals for consumption, like poultry or fish. Research has proven that lighting has a significant impact on animal behaviour and their overall body functions. Further, the period of light and dark also has a significant impact on the circadian rhythm of animals.

Signify provides tailor-made agricultural lighting systems to improve the quality of life for livestock, which leads to

healthier and enhanced production for the farmer.

Since 2019, poultry lighting has become a key focus area for Signify and their AI research has developed an algorithm that identifies the eating, sleeping and comfort patterns of poultry by analysing trial footage and they have used the same to develop a future-proof lighting system that can be continually adapted newer biological insights about the impact of lighting wavelengths on the well-being of poultry are discovered.

Using the extraordinary potential of light by adjusting and adapting light wavelengths that can positively influence the comfort and health of animals, Signify is helping farmers to create healthier, tastier and safer food for consumers. By creating a habitat that's ideally suited to the animal, LED lighting helps reduce early mortality, feed spillage, aggression and contributes to overall animal well-being by reducing stress levels and enhancing their body's natural circadian rhythm. Signify's lighting systems offer a durable and relevant solution that addresses the needs of any poultry producer.

EVOLVE AQUACULTURE

According to the UN, nearly 90% of the world's marine fish stocks are now fully exploited, over exploited or depleted. There is a strong need to conserve fish stocks combined with responsible fish farming. With its LED lighting solutions, Signify is helping customers by delivering specific light recipes that can optimize fish development and welfare, reduce production costs and increase revenue for cultivators.

Light influences all lifecycle stages of fish and can be used as a management tool to control the egg and larvae survival, influence smolt time, maturation control during the on-growing phase and optimize brood stock spawning.

Signify's aquaculture lighting combines



the latest LED technology with research-backed expertise in fish physiology. The company collaborates with leading universities and institutes by funding PhD and post-doctoral research projects in the field. These customized lighting solutions help optimize growth in land and marine based cultivation of shrimp and salmon and has also been proven to be effective for other fast-growing fish species like seabass and seabream. The

lighting supports a lower food conversion ratio, and the right light distribution helps to prevent sea lice exposure, thus reducing treatment requirements by up to 50%. With smooth ramp up and low dim levels it also reduces stress levels for the fish, thereby enhancing their well-being. The light spectrum is optimized for distribution under water, the eye sensitivity of the fish and its pineal

gland photoreceptors, maximizing the light contribution towards growth at their best without maturing. The organization has been helping multiple customers globally in lowering their production costs, maintain constant production and at the same time improve the welfare and sustainability of the fish.

BEYOND FOOD – LOSS OF BIODIVERSITY

Owing to climate change and human activities, natural resources are being depleted at an unprecedented rate, unseen in the history of mankind – which in turn is also resulting in a lot of animal species becoming extinct, both of which will have a grave impact on humankind as well. Humans, their crops, and their domesticated animals are fast using up the earth's limited resources. Massive conversion of forests, wetlands, grasslands, and other terrestrial ecosystems into utilizable land has resulted in a 60 % decline in the number of vertebrates found on the planet since 1970.

Artificial lighting also has a significant impact on nocturnal beings like bats.





Signify with its mission of 'brighter lives, better world' has developed streetlights that use a special light recipe that is perceived by bats as darkness, yet which provides enough illumination for city residents, helping make the roads and pavements safer, while being highly energy efficient. Rare bats in Zuidhoek-Nieuwkoop, in the Netherlands, can now go about their nocturnal business undisturbed thanks to new connected LED streetlights designed specially to emit light that does not affect their natural senses and rhythms.

CONCLUSION

To help create a bright future for people and the planet, the UN has established global goals for sustainable development. These interconnected goals aim to tackle the most pressing challenges we face as a global community including, but not limited to, climate, resource scarcity and poverty. Sustainable agricultural practices are crucial if the world is to achieve the UN's Sustainable Development Goals, for sustainable and resilient cities and communities, and responsible

production and consumption.

Connected LED lighting can either supplement natural daylight or replace it entirely. They can help in setting up indoor farms, often in places that were previously unsuitable for growing food. This produces a wealth of benefits including the ability to fine-tune quality and increase yield. They also, and perhaps more importantly, reduce environmental impacts like the need for land, water, pesticides, and the distance food travels to reach your plate. Connected LED lighting increases resource efficiency that contributes to the transition towards more sustainable and smarter cities, at the heart of SDG 11. And scaling up these solutions creates sustainable food production patterns, which in turn contribute to SDG12.

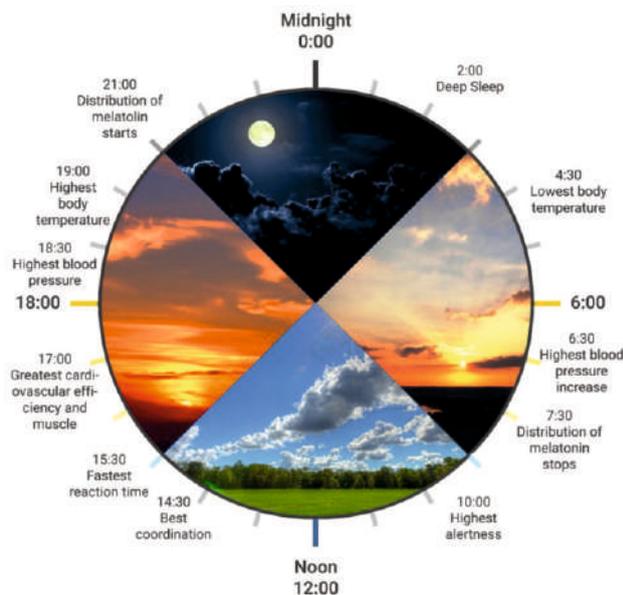
**AUTHOR: KAVISH GOEL,
HEAD – AGRI, SIGNIFY INNOVATIONS
INDIA LTD.**

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Need for faster adoption of Lighting Standards, Well Being and Human Centric Lighting in India

Sudeshna Mukhopadhyay emphasizes the need to embrace the attributes of Human Centric Lighting in Indian Codes and Practices and ensure wider adoption by end customers, architects and designers.



COVID 19 has impacted every individual, our lifestyle, daily routines and our mental health. In this time of uncertainties and worries, coupled with constant news coverage and social media driven news feeds, our sense of anxiety has increased dramatically. This increase in stress levels is disturbing our sleep-wake patterns, leading to changed and disturbed dietary habits, irritability, emotional outbursts and low motivation among other ills. The pandemic has therefore impacted our wellbeing in a manner never experienced before.

Light and its impact on Human Well Being is not a new topic for the lighting industry and its practitioners. Endless webinars have been broadcasted, articles written and all manufacturers are

actively pursuing products and solutions around Human Centric Lighting (HCL). Besides the healthcare and pharma industry, the Lighting (and Indoor Air Quality) industry plays an extremely important and vital role in relieving stress and revitalising our well-being.

ERA OF 1999-2014 - CODES AND STANDARDS IN INDIA- APPARENT CONFLICT BETWEEN LIGHTING VISUAL ENVIRONMENT AND ENERGY CODES

India is a leading nation among the developing economies, that has an established standardisation body, since its independence in 1947. The Bureau of Indian Standards, BIS, not only has widely covered product related safety and performance standards, it has also

application standards, the most common of which are IS 3646 (Code of Practice for Interior Illumination) and IS 1944 (Code Of Practice For Lighting Of Public Thoroughfares). Both these Codes, however are outdated and currently being re-written.

In conjunction to these codes, practicing lighting and consulting architects and engineers take reference from various other building codes while designing buildings (and outdoor spaces). In India, the Green Building Code is a medley of codes and standards contained in the State by-laws, the National Building Code, the Energy Conservation Building Code (ECBC) and in the norms set by the ratings programs, such as Leadership in Energy and Environmental Design-India (LEED-India), the standards and guidelines put down for the Residential Sector by the Indian Green Building Council (IGBC), TERI-GRIHA and other such certifications.

However, while adopting the Green Building standards, in majority of the installations, lighting products and design got reduced to being evaluated on two parameters leading to compromised lighting environment. These of course are (a) Lumens /Watt for product specifications; and (b) Watts (lighting)/ m² for lighting design.

In many installations, lighting levels (lux) were compromised and bargained for, to meet this over encompassing parameter. While the National Building

SPECIAL FEATURE



Code loosely refers to a cross-link between lux and Watts/m², total lighting specification compliance fell below desired levels.

To evaluate a lighting design on the basis of a singular numerical parameter, is equivalent to ringing a death knell to good lighting practices. Built environments were not exuberant, as focus was achieving lighting level only on horizontal task area. While globally the European norms EN 12464-2011 incorporated standards enforcing visual balance, the adoption level in India was low, except for a few projects driven by the lighting designers along with forward thinking customers. The existing/published IS 3646 did not help the cause of good lighting practice.

The National Lighting Code (NLC) was released in 2010. NLC went beyond stipulating lighting parameters for various applications and serves as a guide on good design practices to be followed in the design, selection, installation and maintenance of lighting systems for indoor and outdoor areas. It also dealt in depth the matters related to the science of illumination such as physics of light, electric light sources, luminaires and photometry, coordination aspects to be considered while designing the lighting systems such as daylighting and aspects relating to energy management and energy conservation in lighting installations including guidelines for design and good practices to be adopted for effective and efficient use of light sources.

The National Lighting Code was more accepted as a Guide rather than a reference for standards.

ERA OF 2015 AND BEYOND – RAISING AWARENESS OF WELL BEING AND HUMAN CENTRIC LIGHTING IN BUILDING AND SPACES

The world started recognising that human health cannot be totally separated from planetary health. From the mid of the last decade, awareness of Wellness for occupants of built environment was on the rise. Designers, owners and users, realised that it is vital to understand the relation between occupant's health and well-being and built environment.

The International Well Being Institute published the WELL Building standards V1 in 2014 (Addenda in 2016) and V2 in 2018. Indian Green Building Congress released a pilot standard in 2017. WELL aims to provide a lighting environment that reduces circadian phase disruption, improves sleep quality and positively impacts mood and productivity.

There are ten concepts in WELL V2 ie Air, Water, Nourishment, Light, Movement, Thermal Comfort, Sound, Materials, Mind and Community. There are 14 points and 2 mandatory prerequisites allocated to Light (out of 10 attributes), which is a substantial improvement of lighting representation, when compared to Green standards.

Following are a brief synopsis of the WELL Building V2 standards 1

L01 LIGHT EXPOSURE AND EDUCATION – Prerequisite Mandatory

L02 VISUAL LIGHTING DESIGN | Prerequisite Mandatory

L03 CIRCADIAN LIGHTING DESIGN (3 Points)

L04 GLARE CONTROL (3 Points)

L05 ENHANCED DAYLIGHT ACCESS (3 Points)

L06 VISUAL BALANCE (1 point)

L07 ELECTRIC LIGHT QUALITY (2 points)

L08 OCCUPANT CONTROL OF LIGHTING ENVIRONMENTS (2 points)

It is evident that Human Centric Lighting conforming to WELL Building standards, is beyond tunable white lighting alone (loosely referred as circadian lighting) and needs to conform to product specification and design guidelines. The weightage points of Circadian Lighting and Glare control is same in this standard.

The referred visual standards in L02 VISUAL LIGHTING DESIGN in WELL standard, refers to the European Norms EN 12464 -2011 and the IES Handbook Ed10. The European standards have undergone a revision and the pre-release version prEN12464 - 2019 is available as reference.

There is no conflict between Green Standards and WELL Building standards. A built environment can have dual rating.

ADOPTING VISUAL AND WELL STANDARDS FOR INDIA TO PROMOTE HUMAN CENTRIC LIGHTING

COVID 19 has taught us that the effect of a virus led pandemic is global and affects us equally, no matter where we live and stay. It will be naïve to believe, that Human Centric Lighting (and related standards thereof), is not applicable for developing economy like India. Well-being is universal and all occupants have a right to work in spaces which are safe, healthy and promotes well-being. Lighting is a key ingredient to achieve this objective.

Currently the published lighting codes from BIS do not address the new Visual

requirements and Well Being as incorporated in WELL and prEN12464-1 (or even EN 12464-2011). The National Lighting Code has been revised in 2020 and is now in advance stage of layout designing and printing. The basis of the revision is to include changes in design approach in various application areas, influenced by research conclusions and new technology. Detailed chapters have been included on Solid state lighting systems, Smart Lighting protocols and Internet of Things and Human Centric Lighting. It is expected that the users, designers and the industry embrace this as a reference as soon as it is released.

As the rewriting process of IS 3646 (Code of Practice for Interior Illumination) and IS 1944 (Code Of Practice For Lighting Of Public Thoroughfares) is underway, it is important to widen its scope and include recommendations on lighting parameters which related to Human Centric Lighting along with visual performance parameters.

Concurrently, the National Building Code, which is one of the most popular referred codes, must have an addendum to include parameters to promote WELL Being and have cross reference to National Lighting Code for design practices and application recommendations.

GROWING THE INDIAN MARKET IN HUMAN CENTRIC LIGHTING ABIDING STANDARDS

The Indian Lighting industry is very mature, has strong manufacturing base and boasts of world class human resources including home grown R&D expertise. The current adoption rate of Human Centric Lighting solution is low. The growth in this category can happen when we have standards (code of practice), product standard and labelling for HCL, supported by affordable solutions. HCL is not lifestyle but life enhancing solutions.

We are well aware that cost is a matter of scale. If the price barrier could have been shattered for LED products, it can and should be done again for smart, connected and HCL products. Manufacturers need to bring out affordable and meaningful products in the Indian context, in the following areas.

Smart and Connected lighting – This is a key ingredient for Human Centric Lighting. Both standards (WELL and EN) actively promote daylight integration, dynamic lighting and personalised controls. This paves the way for increasing the user base of Smart and Connected lighting and making it a mandatory requirement rather than an optional luxury feature. With stabilizing and standardization of

wireless protocols, Smart and Connected solutions will be far simpler and flexible to execute and maintain. Proliferation of Smart lighting will also help in shifting paradigm from Watts to Energy which is a true reflection of consumption.

Human Centric Lighting – the key areas to focus in Product Specifications are Light Dynamics and Color Homogeneity, Ratio of melanopic to photopic luminous flux, Flicker Index, Light distribution and Glare, Colour Quality as per new norms, Energy Efficiency Class and Photobiological Safety

All the above specifications are nothing new to the Industry and can well be introduced in product offerings made in India.

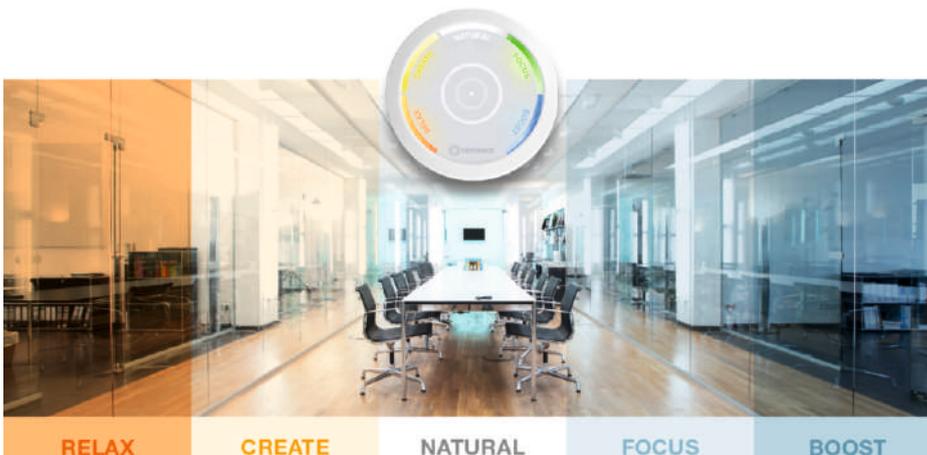
Labelling HCL compliant products will be extremely helpful in facilitating adoption an gaining customer confidence. Testing institutes like VDE offer certification of HCL Products as per the CIE S 026, DIN SPEC 5031-100 standards. Indian Testing houses which have already built up large infrastructure for the CRS labelling under MeitY should gear up to test and certify HCL products.

Much effort by many professionals and academicians has been spent in writing the National Lighting Code and the revisions of IS 3646 and IS 1944. Unless they are widely adopted and implemented in commercial projects, these well written documents, will remain as Library assets.

The support of the leading Industry leaders, ELCOMA and ISLE will be of paramount importance to grow this important category by creating awareness, making affordable and HCL labelled products.

**AUTHOR : Sudeshna Mukhopadhyay
Fellow of Indian Society of Lighting Engineers
and consultant with Havells India Ltd**

Views expressed in this article are those of the contributors and do not necessarily reflect those of the editors or publishers



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Application of S/P ratios in Lighting Design

Increasing efficacies and application of S/P ratio in design may further bring down energy consumption in LED street lighting. The article explores whether having a higher S/P Ratio makes your design better



In S/P Ratio, the 'S' stands for scotopic, while 'P' stands for photopic. Scotopic vision is the term used for low light level vision, where the eye utilizes only rod receptor for sight, picking out movement, but no discernible colour or definition. Photopic vision is the vision of your eye under well-lit conditions and is responsible for colour perception.

But when artificial street lighting is used, we create lighting levels which lie somewhere between photopic and scotopic vision, this transition is known as mesopic vision. During this state, both photopic and scotopic responses are required to enable you to see well.

HOW TO CALCULATE S/P RATIOS?

According to the Lighting Industry Association, a method to indicate how good a light source will be under photopic, mesopic and scotopic conditions is the S/P ratio, which is the scotopic lamp lumens divided by the photopic lamp lumens. If this ratio is

equal to 1 the lamp performs equally under photopic, mesopic and scotopic conditions, and the reading on your illuminance meter will also be correct for all these conditions. A value greater than 1 indicates that the lamp produces more scotopic lumens than photopic lumens, and your meter will underestimate the scotopic illuminance levels. Conversely, a value less than 1 indicates that the lamp produces more photopic lumens than scotopic lumens and your meter will overestimate the scotopic illuminance levels.

By using S/P ratios, the brightness of light the brain perceives for different colours of light enables us to lower energy consumption and still see well.

White Light

As the lamp and LED technology has improved, we are able to produce white light with high efficiency and so the need for cold CCTs dissipated. This has led to greater consideration of how we interact with the light spectrum, for example how the eye works in different

light conditions and what we need to be able to see in low-level lighting environments - including to walk and drive.

The use of white light for street lighting has increased as the efficacies and colour properties of LED's have improved, providing comparable light output to a traditional high-pressure sodium scheme – for a reduced amount of energy consumption. With the advent of white lamp sources replacing sodium, the British Standard for lighting, BS5489 2003, acknowledged that whiter light created a brighter looking environment and so, suggested that lighting designers, using a white light source, CDO-TT or Cosmo Polis for example, on a pedestrian focused lighting scheme (S, or P classes as they are known now), drop a whole lighting class.

WHY ONLY P CLASS ROADS?

Our two classifications of roads in the British Standard and European Normative are M and P.

M class roads as generally used by

Light Source	S/P Ratio
Incandescent	1.36
Fluorescent (3500K)	1.36
Fluorescent (5000K)	1.97
Metal Halide (Warm White)	1.2
Metal Halide (day light)	2.4
High Pressure Sodium	0.65
Low Pressure Sodium	0.25
LED 3500K	1.39
LED 6000K	2.18

Source: Technical Statement LIA TS 24 Issue 1 - 05/2013

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Table : S/P Ratio and Illuminance when Ra ≥60

P class	Eav	Photopic illuminance (lux) for Ra ≥60 according to S/P ratio of lamp												
		0	0.6	1	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8
P1	15	15	14	14	14	13	13	13	13	12	12	12	12	11
P2	10	10	9.4	9	8.9	8.6	8.4	8.1	7.9	7.7	7.5	7.3	7.2	7
P3	7.5	8	7	7	6.5	6.3	6	5.9	5.7	5.5	5.3	5.2	5	4.9
P4	5	5	4.5	4	4.1	4	3.8	3.7	3.5	3.4	3.3	3.2	3.1	3
P5	3	3	2.6	3	2.3	2.2	2.1	2	1.9	1.8	1.7	1.7	1.6	1.6
P6	2	2	1.7	2	1.5	1.4	1.3	1.2	1.2	1.1	1	1	0.9	0.9

Source : PLG03 Lighting for subsidiary Roads: Using White Light sources to balance Energy efficiency and Visual Amenity, ILP Publication

vehicles at speed (motorways, trunk roads, A roads etc.) These are calculated using a luminance method in cd/m2. Luminance measures the light reflected from the road surface and objects are seen in silhouette against this bright background. Colours and edges are less important in this context as you need the contrast.

On the other hand, P class roads are defined as mixed pedestrian and vehicular traffic (residential roads), calculated using an illuminance method measured in lux. Illuminance is considered as the amount of light “falling” onto an object and its surroundings. Here is where a higher S/P ratio can make a difference. Colours become more distinguishable, outlines more vivid and brighter.

Is this the way towards energy savings? Sometimes dropping a lighting class and halving your light levels without considering other implications, is not always the most appropriate thing to do. As the use of LED became more prevalent, and with a deeper understanding of human interaction with certain light spectrums, this “drop a class” method was replaced in the current 2013 version of the British Standard with S/P ratios.

Having covered the background and where it all started, in short, based on the spectral output of the light source, a lamp or LED is assigned an S/P ratio. This is partly why you don't need as many LED lumens to compete with lamp lumens; the quality of the light

dictates how we interpret the brightness of the lit scheme, letting us lower the lighting levels needed to achieve the same effect. This in turn allows you to adjust the levels for that class and deliver major energy and capital cost savings which is good news on all fronts.

It can be clearly seen with higher S/P ratio required lux levels are coming down and hence eventually it will give saving in terms of energy and money if this theory is applied. As per IS1944, this P Class roads (as per British Standard) refer to B Class Roads actually.

DOES HAVING A HIGHER SP RATIO MAKE YOUR LIGHTING DESIGN BETTER?

S/P ratios should only be applied to P lighting classes. By default, lamps or LEDs with high S/P ratios will have a high proportion of their spectral output in the blue/green area; generally, as your colour temperature gets cooler, the S/P ratio improves. 6000K would have a higher S/P ratio than 3000K.

Some Considerations for Using S/P ratios

- Using high blue content LEDs does help to improve peripheral vision, which is obviously important for hazard perception, however the subsequent lowering of lighting levels when using high S/P ratio light sources decreases our focal vision, the part responsible for sharp, in focus images, making it harder to see details as well.

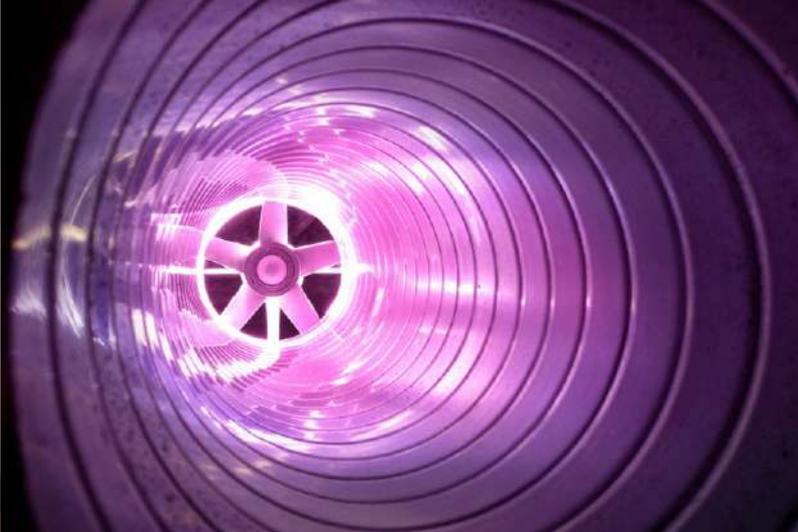
- Research has shown a preference for more human-centric, warmer white light sources in people orientated spaces (3000K and lower), which is at odds with the high S/P ratio light sources.
- High blue content LEDs can be responsible for more sky glow, short wavelength light sources “scatter” more in the atmosphere, meaning more light pollution.
- As per published research, children have a higher sensitivity to blue light and although emissions may not be harmful, blue light (between 400nm and 500nm) may be dazzling and could induce photochemical retinopathy, which is a concern, especially for children below three years of age. The elderly population may experience discomfort with exposure to LED systems. As we age, our eye's ability to absorb blue light lessens, so high S/P ratios can make performing tasks, like driving, even more difficult for the elderly.
- It is not always safe to lower the lighting levels too much.

There is no simple yes or no answer to whether having a higher S/P ratio makes your lighting design better and there is no definitive right or wrong. But we should be mindful when applying S/P ratios to consider the space and the user. It is still possible to reduce lighting levels and light a space well and comfortably using good quality warm LED sources. It may be wise to steer clear of the 1.8 or 2+ ratios and find a middle ground that will satisfy the paying customer with energy savings and the people expected to use and live in the space, who unfortunately seem to be often forgotten.

AUTHORS : SANTOSH AGNIHOTRI, D.G.M / HEAD- QUALITY & TECHNICAL AND SOURISH DE, HEAD- R&D, ORIENT ELECTRIC LIMITED

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Corrigendum to PLI Scheme Guidelines

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Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing

- Incentive:** 4% to 6% on incremental sales (over base year) of goods manufactured in India
- Target Segments:** Mobile phones and specified electronic components
- Eligibility:** Subject to thresholds of incremental investment and incremental sales of manufactured goods
- Tenure of the Scheme:** Five years subsequent to the base year as defined (FY19-20)

Subsequent to the PLI scheme Guidelines published by DPIIT in June 2021 and based on suggestions received from Industry Associations, potential applicants, other relevant stakeholders, DPIIT have issued a corrigendum to Scheme Guidelines. The highlights of the changes are listed within this article.

- **Changes to Base year Criteria :** 2019-20 is to be considered as the base year for computation of cumulative incremental investment and net incremental sales for eligible products as well as financial attributes under pre-qualification criteria. However, for the applicants meeting the pre-qualification criteria based on financial attributes as per FY 2020-21, the computation of net incremental sales of eligible products shall be done based on net sales

- including Metal Clad PCBs
- Resistors
- Fuses
- Capacitors
- LED Transformers
- Laminate for PCB and MCPCB
- Metallized film for capacitors

- **Changes to the Global Revenue criteria :** For the Global Revenue criteria, the Global Revenue would be considered as the consolidated revenue both in India and overseas, in the audited financial statement in the base year 2019-20 or FY 2020-21, as the case may be. Similarly, in the case of Group Companies of applicant whose revenues for the base year have not been consolidated in INR, the revenue in the respective

turnover of the eligible products in the year 2020-21, whichever is higher.

- **Changes (addition) in Target Segment and eligible products:** In the Target Segment of LED Components, in the list of Eligible Products (Additional) the following items have been added

- Printed Circuit Boards

currency shall be converted in INR at an average of currency exchange rates as on 1.4.2019 and 31.3.2020 for the base year and at average currency rates as on 1.4.2020 and 31.3.2021 for FY 2020-21.

- **Minimum amount of Gross Block, Global Revenue and Net worth criteria :** These parameters would be calculated as on 31st March 2020 or 31st March 2021 and the same applies to clause no. 7.5 of the original guidelines.

Some New Clauses have also been added to the PLI Scheme Guidelines

- **Eligibility Clause:** At least 60% of the net incremental sales, including captive consumption, shall comprise of eligible products used in the manufacturing of LED Lights.
- **Exit Clause:** If any selected applicant declines the offer of approval under the Scheme at any stage or exits the Scheme without making full committed investment for reasons whatsoever, in such case
 - The bank guarantee furnished by the selected applicant shall be invoked as per provisions of the clause 10.9 of the scheme guidelines and
 - The applicant shall have to refund the incentive availed by it under the Scheme till such date along with interest calculated at the prevailing 3-year SBI MLCR compounded annually.

AUTHORS : ILLUMINATION EDITORIAL TEAM

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Wipro supports Frontline Workers

Wipro's ground teams closely worked with local government officials across the country to provide support to the society and frontline workers and worked with local government hospitals, especially in remote areas to strengthen the medical facilities near to them. Wipro's major focus was on COVID-19 health care / preventive health and creating health infrastructure and hygiene support. The ground teams

worked with the District DC/DM, District health officers, Chief medical officers to ensure that the support reached those it was intended for.

Wipro generously donated over 35 lakhs numbers of Santoor soap along with Handwash, Sanitizer, Surface Sanitizer Spray, Floor Cleaner, Fabric Conditioner, Surface Sanitizer to the needy. Along with Ambulances at Hyderabad and Haridwar, Wipro donated a number of medical

equipments like Oxygen Generation Plant, Ventilators, Truelab machine for Covid testing, RT PCR - Testing Machine, RNA extractor - Testing Machine, Oxygen concentrators, Real Time Micro PCR Analyzer, Portable X Ray machines, Pulse oximeters, Automated external defibrillators (AED) as well as Consumables like PPE kit (Contains Coveralls, Gloves, Shoe Covers, Goggles) and N95 masks.



New Ambulance being handed over to a hospital at Hyderabad



Soaps being handed over to the DC/DM at Tumkur, Karnataka



Soaps being distributed to the needy at Amalner



Ventilators and Monitors being supplied to district officials at Amalner, Maharashtra

Future Ready Stadiums with the Best Fan Experience

An article that delves into the needs and role of the modern sports arena



With the advent of various IoT based Smart systems there have been great changes in the lifestyle of people across the globe. The way people live, work, move around and spend their time has huge impact of these systems. These Smart and Connected systems are employed to improve the quality of life as cities grow and to protect the environment through more sustainable operations.

IoT based systems combine Digital Lighting products with cloud-based management systems and data services to make applications smarter, better and more efficient. While designing light to provide a visually comfortable environment, lighting designers can use this environment to collect data via sensors or other tools embedded in these light systems. This data can be used and shared with management systems that allow marked improvements in our environment and therefore our way of working.

EVOLVING ROLE AND NEEDS OF MODERN STADIUM

Today when we take a look at Sports Stadiums, we can observe clear signs of change that is expected in the facilities being provided to those visiting these stadiums. These Arenas are required to be 'Future Ready' and should be providing the best 'Fan Experience'.

Stadium owners would like to provide fully immersive and synchronized experience to fans from Entry to Exit from stadiums. Earlier stadiums were facilities that were simply used to hold a game or an event that can be viewed by thousands of spectators but now this definition is changing fast. Now the prime focus of an operator is to provide a 'unique' experience to the fans when they visit the stadium and carry back the 'experience' with them and cherish it for a very long time. Arenas are now becoming multi-purpose hubs that may not be dedicated to a single or unique game and most arenas are used for some non-sports activities too.

Event broadcasters constantly keep upgrading their equipment and the venue has to comply with their increasingly

stringent broadcasting standards. Above all, there is an increased focus on safety of the people and equipment as well as compliance to sustainability standards. Arena operators of sports and entertainment venues today want to create visually stunning experiences for their fans and partners. They want to ensure that their venues are flexible and multi-use while reducing their operational costs. Venues can potentially cut their electricity bills in half, maximize revenue potentials, and realize significant savings on maintenance costs by choosing the right management systems and applications.

LIGHTING OF SMART STADIUMS

IoT based Connected Lighting System plays an important role in providing a unique fan experience in a Smart Stadium. IoT based systems manage the lighting of these arenas such as Pitch lighting, entertainment lighting, the Stadium façade, etc and are able to entertain fans with customized light shows.

Smart Lighting systems in an Arena attract sponsors through unique new advertisement opportunities and support stadium owners by enabling them to have flexible, multi-purpose venues that generate new revenue streams. Using web based interfaces all lighting operations in a Smart Stadium can be monitored, managed and maintained throughout the venue.

Lighting Management

Allows easy monitoring and control of connected lighting across all areas of the venue. Various types of lighting from Pitch to Entertainment can be controlled using a single future-ready platform that integrating the entire stadium's lighting and ensures optimal lighting performance across the playing area, entertainment shows and concourses.

Scene Management

Allows users to create stand-out fan

experiences and sensational TV viewing to help the stadium a premium venue. The single unique platform for scene management manages stadium light shows in the bowl along with exterior architectural lighting and allows controller to flash team colors, celebrate a home goal, energize the crowd and of course wow the fans.

Bio-Adaptive Lighting

Athlete focus and well-being can be improved with bio-adaptive lighting in the locker room. Bio- adaptive lighting can be adjusted to energize, relax, or increase the concentration of players and athletes. IoT based stadium system employs a unique platform that uses connected lighting to augment a smart stadium sports science program.

Single Dashboard

Stadium owners can monitor, manage and optimize connected lighting across

the entire stadium from dedicated IoT based Sports System dashboards and manage both the venue and the audience as efficiently as possible using accurate data and insights

Integration with APIs

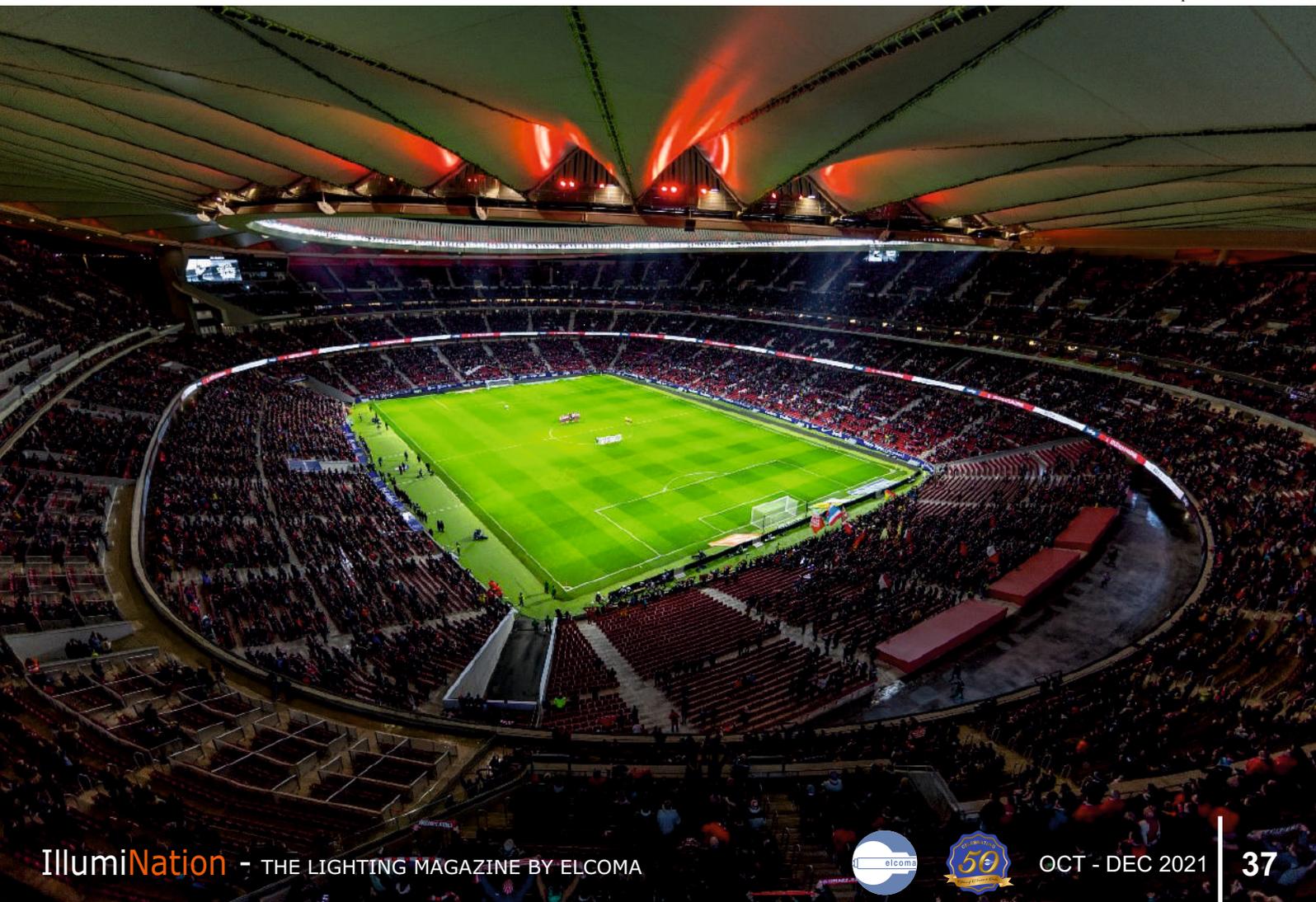
Use of Open APIs enable integration with other data sources and stadium systems and allows partners and third parties access to the data to build additional applications and services

Extend the Game Day

Stadium owners can extend the game day beyond the game itself with unique entertainment experiences before, during and after the main event using these unique IoT systems.

**AUTHOR: SIGNIFY INNOVATIONS
INDIA LTD.**

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Metrology of Optical Radiation for “non-visual” effects of Light

The article discussed the new metric introduced by CIE S026/E:2018 to describe the ability of optical radiation to stimulate each of the five photoreceptor types

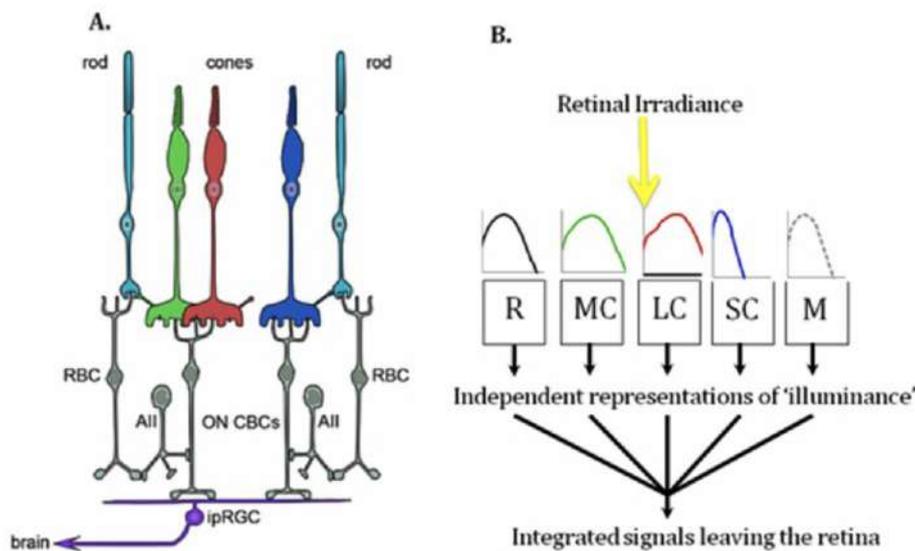
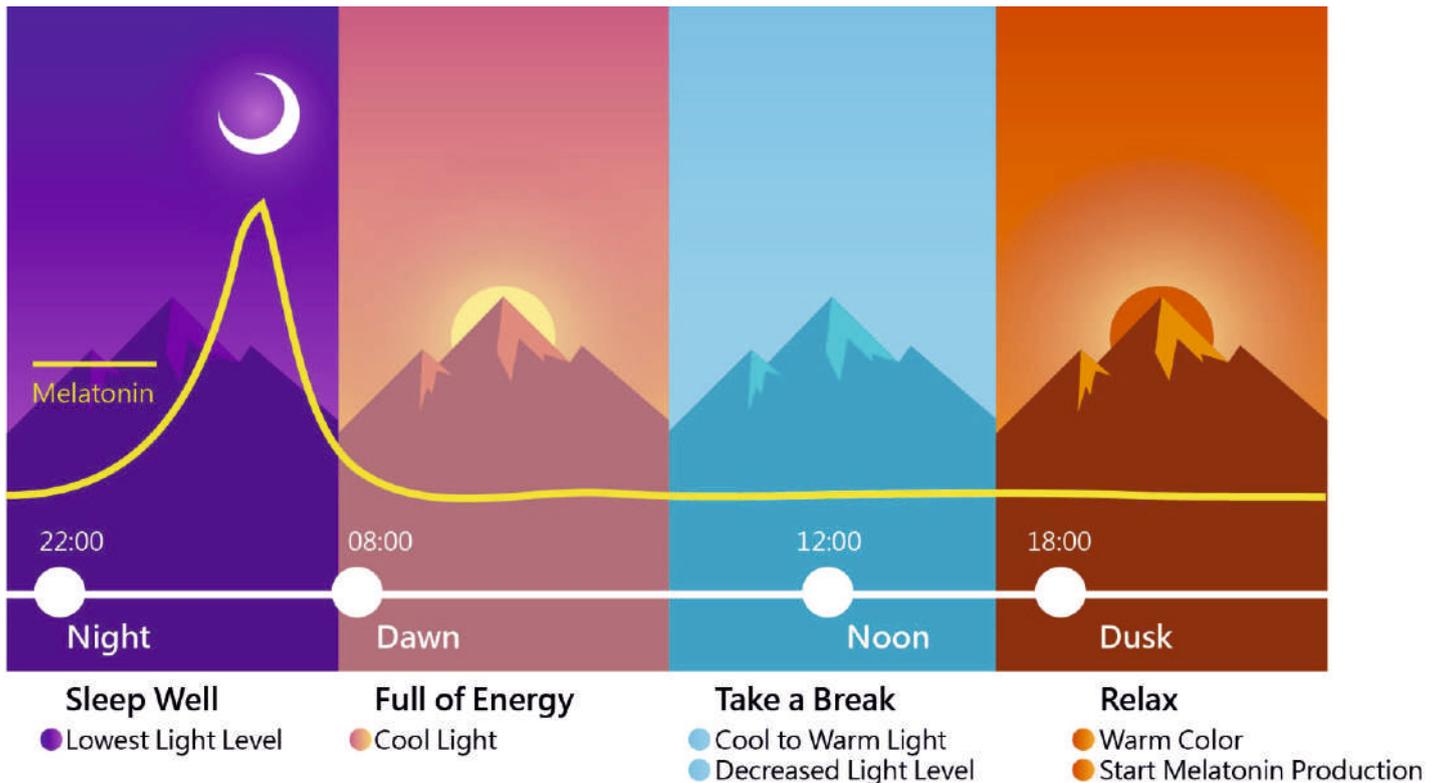


Fig1. Photo-Receptors

There is strong scientific reference that light is not only essential for vision but also achieves important biological effects relevant for human health, performance and well-being that are not dependent on visual images. We have become the indoor generation. On average, we spend more than 90% of our time indoors, with 36% of that spent in the workplace. But the more time we spend indoors, the less we're exposed to the beneficial effects of light. In the previous editions of "Illumination", we have had many an article on human centric lighting which refers to Circadian Lighting Systems. In order to achieve such a "biologically effective lighting" system we need to

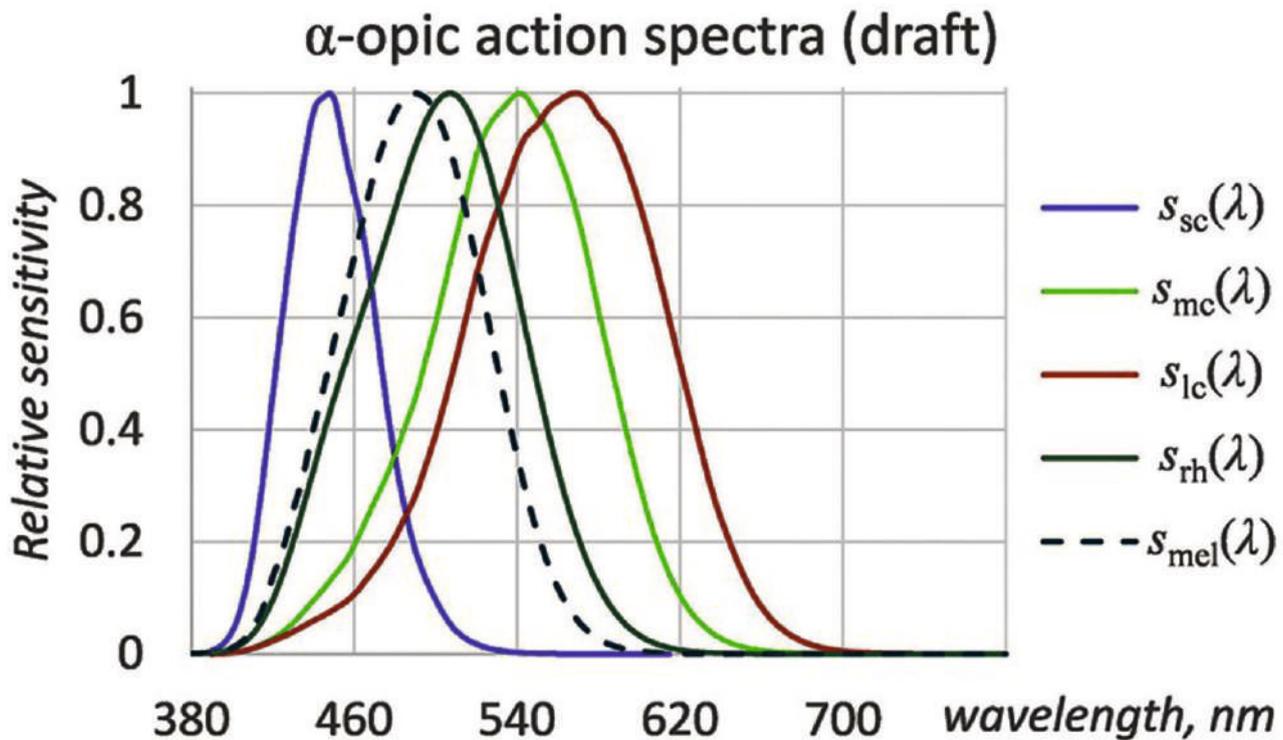


Fig2. Normalized Action Spectra

evaluate terms such a melanopic-Equivalent Daylight Illuminance (m-EDI).

In this article we will discuss upon the new metric which CIE S026/E:2018 has introduced to describe the ability of optical radiation to stimulate each of the five photoreceptor types that can contribute, via melanopsin-containing intrinsically-photosensitive retinal ganglion cells (ipRGCs), to retina-mediated non-visual effects of light in humans.

The CIE S026/E:2018 – CIE System for Metrology of Optical Radiation for ipRGC-influenced Responses to Light document along with S026 Toolbox helps us to simulate the metric quantities to estimate the non-visual effects of Light.

The metrology is based on five photoreceptors and defines five spectral weighing functions (i.e. action spectra), $S_{\alpha}(\lambda)$, for the five retinal photoreceptor classes: S cone, M cone, L cone, rhodopsin and melanopsin encoded

photoreception of ipRGCs.

For each of these five (α -opic) photoreceptors an α -opic irradiance (or radiance etc.) can be calculated from the spectral irradiance of a light source [see Table 1].

The α -opic irradiance of a light source divided by its illuminance defines the α -opic efficacy of luminous radiation (α -opic ELR) of this source [see Table 1]. Moreover, one can also express how much daylight (D65) is needed to achieve a given α -opic irradiance. This quantity is denoted as the α -opic equivalent daylight (D65) illuminance (α -opic EDI) and is expressed in lx [see Table 1]. The ratio of the α -opic ELR of a test source to the α -opic ELR of standard daylight (D65) defines the α -opic daylight (D65) efficacy ratio (α -opic DER) [see Table1]

The S026 Toolbox helps to perform the α -opic calculations i.e. calculations to the nonvisual responses to light / ipRGC influenced responses to light. Since lighting professionals and photo

biologists are interested in this topic the toolbox also provides a conversion from different systems people use to represent light. (e.g. Radiometric quantities – weighted irradiance values, Photometric system – equivalent illuminance values, photon-based system – weighted irradiance values which are used in photobiology). The Toolbox can be downloaded from the CIE Website

By visiting the CIE website to download the S026 toolbox and go through the S026 User Guide and video, one can arrive at calculating the melanopic Equivalent Daylight Illuminance (m-EDI) or the melanopic Daylight Efficacy Ratio (m-DER). It is also recommended that one should go through the CIE POSITION STATEMENT ON NON-VISUAL EFFECTS OF LIGHT - RECOMMENDING PROPER LIGHT AT THE PROPER TIME, 2ND EDITION (OCTOBER 3, 2019) which mentions that we should extensively use the new S026 toolbox in order to characterize light for its non-visual

effects.

From a lighting designer's perspective this means that the melanopic EDI and DER for a given design should be estimated and provided along with the requirement of the visual lux level.

The WELL Building Standard is dedicated to the concept of building designs that promotes healthy environments for living, working, learning and play (WELL 2019). One of its hundreds of design guidelines is Feature 54, Circadian Lighting Design^[1]. The underlying concept is to predict or measure the Equivalent Melanopic Lux (EML) incident on the vertical plane at the eye level of the occupant.

For work areas, the design requirements state that at 75 percent or more of workstations, at least 200 EML (including daylight if present) must be provided at four feet above the floor facing forward (to simulate the view of the occupant) between the hours of 9:00 AM and 1:00 PM for every day of the year; or for all workstations, maintain

illuminance of at least 150 EML on the vertical plane facing forward. There are similar requirements for living environments, breakrooms, and learning areas.

While addressing the issue of designing for a non-visual optical effect it is important to understand melanopic concepts and what is it at product level one should look for.

Melanopic light is the part of biological light which plays a major role in synchronizing the internal body clock in line with non-visual effects of light. By properly designing melanopic lighting in a building, it brings the benefits of natural daylight indoors, enhancing visual comfort, well-being and performance. Melanopic light has a direct relation with – light intensity, light and dark cycle (circadian rhythm) and light spectrum.

Melanopic equivalent daylight illuminance (Melanopic-EDI; unit lux), is the circadian metric adopted by the International Commission on

Illumination (CIE). It describes the response of the non-visual photoreceptors (ipRGCs) in our eyes. This response is indicative for how the body will respond and is a combination of the spectrum of the light and the intensity.

Melanopic daylight efficacy ratio (Melanopic-DER) is a spectral metric of the biological effect of artificial light source compared to daylight (6500K). The melanopic-DER of a reference daylight spectrum is 1. Typically, artificial lighting has a lower biological effect than daylight, the melanopic-DER being below 1.

While analyzing the melanopic action spectra and the spectral distribution of a standard LED light source, enhancing the LED spectrum with cyan light increases the biological impact of the light. The melanopic-DER for such light sources compared to standard LED spectrum will be high. The visual color impression and visual light output (e.g. CCT 4000K, CRI>80, R9>50) might

Quantity	Formula	Meaning	Unit
α-opic radiant flux	$\Phi_{\alpha} = \int \Phi_{e,\lambda}(\lambda) s_{\alpha}(\lambda) d\lambda$	weighted spectral flux integrated over wavelength	W
α-opic irradiance	$E_{\alpha} = \int E_{e,\lambda}(\lambda) s_{\alpha}(\lambda) d\lambda$	weighted spectral irradiance integrated over wavelength	W / m ²
α-opic radiance	$L_{\alpha} = \int L_{e,\lambda}(\lambda) s_{\alpha}(\lambda) d\lambda$	weighted spectral radiance integrated over wavelength	W / (m ² ·sr)
α-opic efficacy of luminous radiation	$K_{\alpha,v} = \Phi_{\alpha} / \Phi_V$	quotient of α-opic radiant flux, Φ_{α} , and luminous flux, Φ_V	W / lm
α-opic equivalent daylight (D65) illuminance	$E_{v,\alpha}^{D65} = \frac{E_{\alpha}}{K_{\alpha,v}^{D65}}$	Illuminance level of daylight D65, producing an equal α-opic irradiance as the test source	lx

Table 1 – Examples of α-opic quantities as defined in CIE S 026/E:2018. The table provides definitions based on irradiance and illuminance. However, also radiance and luminance can be used to define the corresponding α-opic quantities, see Fig. 3.

Specifying light in different systems

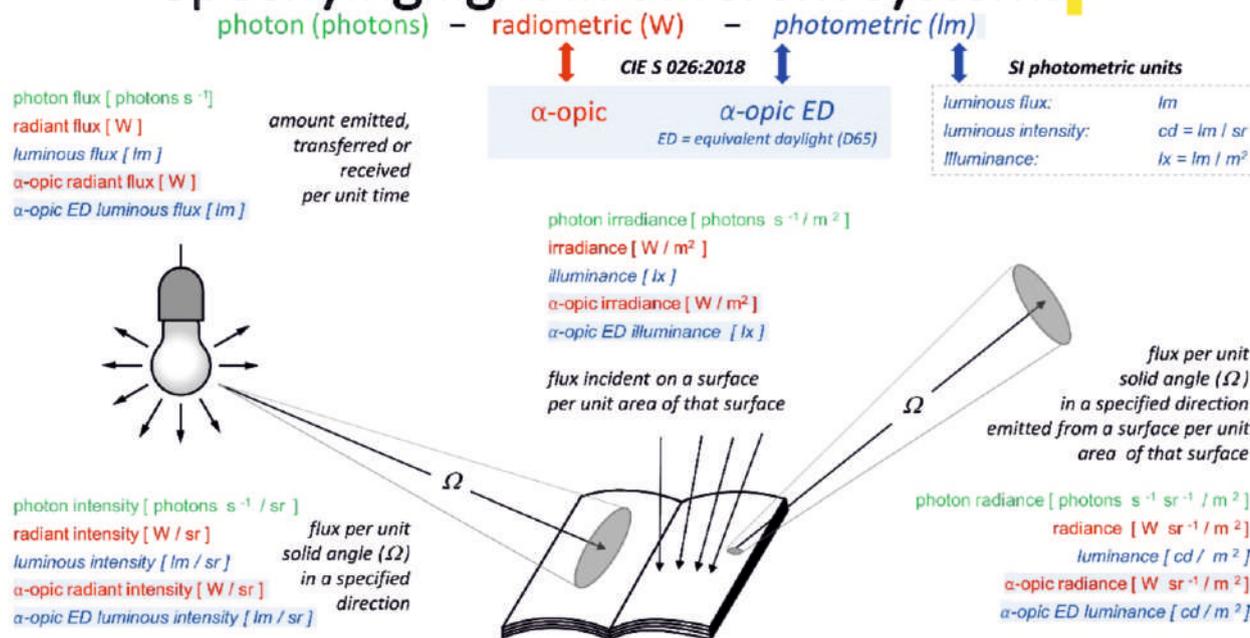


Fig.3. – CIE defined quantities and their units which can specify light in the photon system, the radiometric system and the photometric system. The corresponding α-opic parameters as defined in CIE S 026/E:2018 are also shown.

remain the same.

There may be other options of obtaining the equivalent melanopic lux:

- Get more light or increase number of lighting luminaires (leads to increase in energy cost)
- Use luminaire with high light output (leads to increased energy cost, glare issues)
- Increase color temperature with tunable white (increase in color temperature increases the DER, but not everyone likes bluish light)
- Use luminaire with LED source which has high m-DER (achieved through expensive LEDs)

Obviously, there are multiple design

routes to enhance the non-visual effect of light for health and wellbeing but there are certainly some tradeoffs one has to decide upon.

The DRAFT prEN12464:2019 - Light and lighting - Lighting of work-places - Part 1: Indoor workplaces, which is the European Standard for lighting design is supposed to supersede the EN12462-1:2011. Annex C.1.5 in the document does mention about the influence of spectral power distribution on non-image forming effects but no such limit values as mentioned in the WELL standard is included. An alignment with the WELL standard should be considered while converting the draft to a final version. The Indian Standard for lighting design IS 3646 is also being

revisited and similar requirements for non-visual metrics for lighting for health and well being should be considered and incorporated.

Lighting regulations and practice often still focus on visual and energy efficiency aspects of light, with little or no attention being paid to IIL responses. Conversely, there are many lighting products entering the market that are intended primarily to influence IIL without careful consideration of other lighting quality aspects. An improper balance between these two approaches can result in lighting conditions that compromise human well-being, health and functioning and that fail in terms of overall lighting quality.

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AUTHOR: SOUMO GHOSAL – SENIOR MANAGER, CENTRE FOR RESEARCH AND INNOVATION, HAVELLS INDIA LIMITED

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Osram's new purifier cleans the air in cars



Osram's Air Zing Mini air purifier, which easily fits on air vents, removes germs from the air inside vehicles to improve air quality for drivers and passengers. With the help of ultraviolet light, the handy device can eliminate up to 99.9 percent of viruses and bacteria. Osram is using its expertise in photonics and ultraviolet light to continue expanding its portfolio.

Osram's Air Zing Mini works with

ultraviolet light at a wavelength of 360 to 370 nanometers and a titanium dioxide filter. It can remove viruses and bacteria from the vehicle's air with a reliability of up to 99.9 percent. The device has already been successfully tested against bird flu viruses. The air purifier also eliminates airborne allergens, pollutants or smells.

With a diameter of 7.5 cm, the compact, round device is no larger than an apple and easily attaches to the vehicle's ventilation slats with a clip. A USB cable supplies power to the air purifier via any standard USB socket. The Air Zing Mini purifies the air by drawing it into the unit and passing it through a titanium dioxide filter, onto which a series of UV-A light emitting diodes shine. A photo-catalytic

reaction kills viruses and bacteria cells before the purified air is expelled through the top of the housing. The filter can be cleaned with clear tap water, dried and reused. There is no danger to passengers from the encapsulated UV radiation.

Additionally, the device can be used freestanding, making applications outside the car possible, including on office desks.



Signify Expands its Wi-Fi portfolio



Signify announced the expansion of its Philips Smart Wi-Fi ecosystem in India. The portfolio now includes smart LED downlighter, T-Bulb, T-Beamer and Batten in addition to the smart bulbs that were launched in 2019. Consumers can now adjust your shade of white light, from a relaxing, warm white to an energizing, cool daylight, and enjoy pre-set modes to support your daily lighting needs.

The Philips Smart Wi-Fi products work on Wi-Fi and can be easily controlled using a mobile app or voice assistants such as Google Assistant and Amazon Alexa. They operate on the WiZ technology platform, and users can get started simply by installing the easy-to-use WiZ app on your smartphone or tablet and connecting it to their home's Wi-Fi network – no wiring, smart hub or

additional equipment is required.

These smart lighting products let customers create the perfect mood for every moment. By choosing the right shade of white light to suit different parts of the day, users can support their body's natural circadian rhythm and enhance well-being. They can also automate their lighting, using timer and scheduling functions.

Bajaj Launches Ivora Range

With more than 80 years of legacy, Bajaj Electricals Limited has been a front runner in the illumination and lighting categories. Over the decades, Bajaj Electricals continues to bring world-class products with futuristic LED technology that is green, energy-efficient and aesthetically dynamic. The latest array of LED lights is a valuable addition to the company's product portfolio that caters to consumer's need for smart and value-added solutions. The brand has recently launched a range of LED products that offer unique solutions for every lighting need of the Indian consumer.

Bajaj Ivora Insect Shield LED Lamp (9W) - Serves the dual purpose of illumination and keeping mosquitoes and house flies at bay. The innovation lies in the unique yellow -spectrum light that enables it to create an invisible insect shield and provide protection to consumers. The light's shield works well in both indoors and outdoors set-ups making it the perfect partner when battling insects like mosquitoes and houseflies. The product is specifically



designed considering the tropical Indian climate where mosquitoes and

insects become a genuine concern especially during evening hours and the monsoon season.

Bajaj Ivora Plus LED Battens & Panels - delivers the lumen efficacy of 110 lm/W which means the consumers get more brightness for the same power used. These products have 2.5 kV Surge and are designed to deliver glare free light along with a long life of up to



25,000 hours based on usage. The Ivora Plus Battens are available in 16 & 18 W (CDL) and Ivora Plus Panels are available in 6, 12 & 18 W (CDL).

Bajaj LEDZ Inverter Lamp & Battens – ensure that consumers do not have to live in darkness during power cuts as the range comes with up to four hours of power back up. It is ideal for places with frequent power cuts or an inconsistent supply of electricity. These products are equipped with an auto cut-off after full charge feature, 2.5KV Surge protection and have a long life of up to 15,000 hours based on usage. In this range are the LEDZ Inverter Lamp 9W (CDL) and the LEDZ Inverter Batten 20W (CDL)



Luker Launches Solar LED Lights Architectural Range



Luker Electric Technologies Pvt Ltd. One of the fastest growing companies in Lighting Industry has Launched SOLAR LED ARCHITECTURAL RANGE of products for domestic & commercial segments. This marks a significant step by the company towards encouraging renewable energy based products which is gaining prominence nowadays.

These architectural lights gives more

flexibility for Architects and Landscape designers because of non-existence of power supply requirements. Complete range of LUKER Solar LED lights comes with integrated high efficiency solar panels and Lithium based battery. This makes the product easy to install & maintenance free.

Range includes wall lights, bollards, gate lights & garden pole lights to name a few.

Innovative & Cost-Effective Fire Alarm by Halonix Shield



that can easily fit into a B22d or E27 bulb holder. The product is proficient in detecting Smoke, Carbon Monoxide, LPG, Methane, Hydrogen and uses a powerful, loud alarm to alert users about a fire. The Fire Alarm by Halonix Shield takes only 1-2 minutes to set up and requires no additional assistance and is

designed to set off only when the smoke exceeds the preset value.

Most people do not have a fire alarm at home, at their shops or in small offices as its set up is difficult and can be

relatively expensive. With the plug & play Halonix Shield Fire Alarm both these issues have been addressed and it is expected that many more people will be able to protect their loved ones and their assets from the ravaging effects of fire. All that the customer has to do is simply plug the product into a bulb holder to safeguard your loved ones from any unforeseen fire-related situations. The Plug & Use Fire Alarm by Halonix Shield can be used in a wide number of applications such as Family Kitchens, Office Premises, and Warehouses & Shops.

Halonix Shield is a sub-brand of Halonix that offers innovative, value-for-money solutions to meet the health & security needs of customers and introducing novel, cutting-edge, indigenously manufactured products and solutions for both residential and institutional use.

Halonix is redefining innovation with its Plug & Use Fire Alarm under its sub-brand, 'Halonix Shield.' The Halonix Shield Fire Alarm comes with a simple yet unique design

Signify launches EcoLink Air Purifier



Recently Signify launched its EcoLink Air Purifier with UV-C technology in India. This air purifier is designed to purify and disinfect air at the same time and is equipped with a HEPA filter and UV-C lamps. While the HEPA filters help purify the air by removing dust, pollen and other particulate matter, the UV-C

technology helps to inactivate airborne pathogens, including SARS-CoV-2. UV-C is a well-established method of disinfection, used to prevent the spread of diseases by disinfecting air, water and surfaces. All bacteria and viruses tested to date respond to UV-C disinfection.

The EcoLink Air Purifier with UV-C technology follows a two-step

purification process, wherein the air first passes through an H12 HEPA filter, that filters out dust, allergens, spores, pollen, pet dander and other particulate matter. Next, the hi-powered UV-C lamps inside the chamber emit UV-C radiation, inactivating all known bacteria, viruses and other microbes giving out pure and healthy air. The UV-C lamps are placed inside the HEPA drum which in turn also helps to inactivate microbes and pathogens that maybe trapped in the filter itself. The unit is available in a black or white version and comes in three sizes: small, medium and big, for efficient performance in a variety of room sizes.

Orient Electric Launches 0.5W LED Lamp with Rainbow colors



Orient Electric recently launched its Deco Rainbow 0.5W LED Bulb ahead of the festive season. With very low power consumption, the consumer gets all the seven primary colors (Violet-Green-Red-Blue-Orange-Yellow-Pink) in a single bulb reducing the need to buy several different bulbs. The bulb can be

used anywhere inside the homes for decorative purpose like pooja-ghar, kids' room or during parties at home. The bulb comes in attractive packaging and has auto color changing technology. The product used high grade housing for superior aesthetic appeal and has long life of 20000 hrs.

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 Tel : +91-11-41556644/46604947 Email : deepakkumar@elcomaindia.com

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