european energyinnovation

LEDs under the lens

Preview

2nd LED Professional Symposium and Expo

LED lighting – from revolution to mainstream

LED a disruptive technology and a new lighting resource

Broadband communication from the LED ceiling light

2nd annual LED professional Symposium & Exhibition

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OSRAM Opto Semiconductors

TRIDONIC enlightening your ideas

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2 April 2012:

'We are thrilled to bundle the forces of Lemnis Lighting and NTL Electronics. To us, sharing knowledge and expertise in the field of sustainable lighting is the only way to truly generate impact. 19% of global electricity consumption goes to lighting. But more than 90% of the electricity consumption of an incandescent is transformed into heat. The new organization reflects the global need to drastically bring back waste.'

Mr. A. Gupta, CEO NTL-Lemnis.

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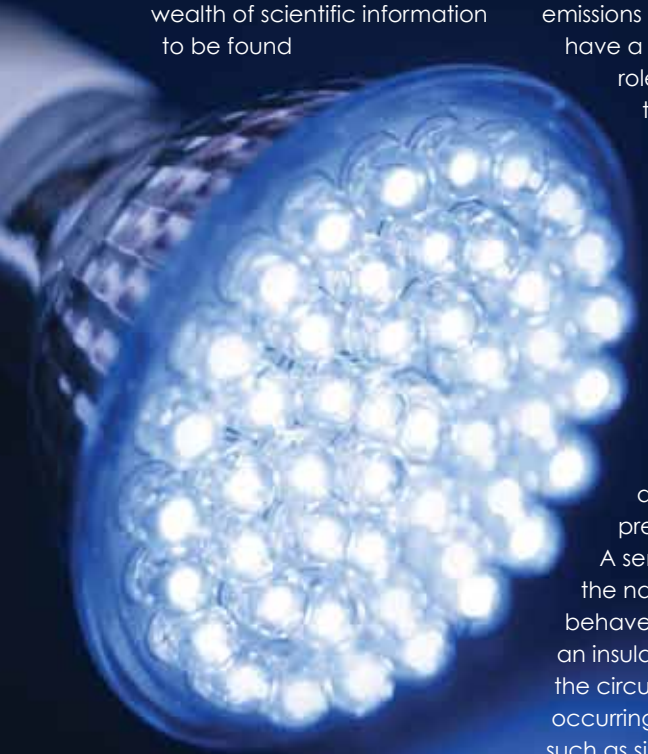
How do LEDs work?

George Carlin was an often controversial American comedian and satirist, who observed that "When Thomas Edison worked late into the night on the electric light, he had to do it by gas lamp or candle. I'm sure it made the work seem that much more urgent." A conventional light bulb of the type with which Edison is usually identified converts as little as 10% of the electrical energy it consumes into useful light: as we focus our attention increasingly upon the significance of lighting in the context of our carbon footprint, Carlin's comment seems to have a more than humorous resonance.

The Light Emitting Diode (LED) has begun to arouse interest; in particular, eye-catching claims have been made for its near-indestructibility and dramatically lower energy consumption. European Energy Innovation is not a technical journal, and there is already a wealth of scientific information to be found elsewhere, so we will spare readers the detailed science on these pages. But the subject has become too important for us to ignore.



Important? Well, some of the excitement we have mentioned includes the observation that rapid adoption of LED lighting in the U.S. could save almost 350TWh of electricity, or the annual output of forty 1000 MW power plants, while the proportion of Europe's electricity bill that is spent on lighting is often quoted as approximately 20%. Europe is addressing this issue: recent legislation concerns compact fluorescent light bulbs (CFLs), which are substantially more efficient than standard incandescent bulbs. However, LEDs promise potentially even lower energy bills and even greater longevity. Simply replacing conventional light bulbs with CFLs or LEDs could go a very long way towards achieving Europe's 20-20 emissions target. LEDs clearly have a potentially important role to play, so how do they work?

A few simple principles will help, dare we say, to shed some light on the topic. We all understand that an electric current is in effect a flow of electrons through a conductor, and that an insulator prevents such a flow. A semiconductor, as the name suggests, can behave as a conductor or an insulator depending on the circumstances. Naturally-occurring semiconductors such as silicon normally have 4 electrons in their outermost shells but, unlike in a metal conductor such as copper, these are not always available for the transfer of electric current; this explains the semiconducting property. A diode, as its greek name suggests, comprises two principal components, two halves so to speak; both are semiconductors.

One of the semiconductor halves of an LED contains added atoms that each have one extra available electron. In the other half, there are added atoms that each have one fewer available electron, effectively creating electron-sized "holes" in the structure. The key point is that the electrons in these "holes" effectively possess less energy than the surrounding ones.

Electrons enter an LED when it is correctly connected to an external circuit, releasing others to move through it following the polarity. When they encounter a "hole", these electrons drop into it and must release some of their energy. This energy emerges in small packets - photons - that happen to correspond to what we perceive as light. In effect, electrons entering the diode have more energy than those that leave it to complete the circuit, and this difference in energy corresponds to the light that is emitted.

Edison's work was based upon an earlier patent for a lamp with a carbon filament. Carlin would surely have appreciated the irony in the urgency with which we are addressing the removal of carbon from both generating energy and creating light. ●

Well-being and social activities thanks to beneficial lighting

Zumtobel study at St. Katharina old-age home

Better lighting improves people's quality of life. Higher levels of dynamically controlled light increase well-being in the elderly. These are the findings luminaire manufacturer Zumtobel has obtained from a study conducted at a care home in Vienna, in collaboration with the Lighting Competence Centre and other partners. to this study, large quantities of light can improve the circadian rhythm of older people, especially of people needing care who do not have regular access to natural daylight.

People's quality of life strongly depends on their vision, among other things. In old age, the quantity of light required for any type of activity increases dramatically because of the age-related cataract of the eye – it may even amount to three times the generally applicable standard illuminance level of 500 lx. However, light is not only essential for perception, it also has a biological effect on people. For instance, light has an effect on people's day/night rhythm via retinal receptors. Sufficient daylight suppresses melatonin production, while the hormone melatonin produces sleepiness at night. Too little light by day has negative effects on people's well-being and may cause sleep disorders and depressive moods, among other things.

This means that light can have a variety of effects on the human organism. In a care home for dementia patients in Vienna, Zumtobel tested a variety of dynamic lighting scenarios and their effects on people during the day to find out whether it is possible to stabilise the residents' circadian

rhythm and thus increase their well-being.

For this purpose, a lighting system – luminous ceilings that can produce various lighting situations – was installed at the dementia ward of the St. Katharina old-age home in Vienna, and its effects on the residents with respect to their communication and interaction behaviour were examined. The standard situation was compared to three different lighting situations, each of them differing in terms of increased lighting intensity, a modified spectrum and dynamic changes in lighting.

The investigations have demonstrated the positive impact of dynamic lighting concepts and increased illuminance levels. An increased willingness to communicate and generally higher vitality and activity levels during the day were observed in the patients, as were more peaceful sleep phases in the night, requiring only slightly higher basic costs. Expressed on a per-capita and per-day basis, the cost increase amounts to only EUR 1.45 (calculated over a period of ten years). Taking the savings on medication costs due to more beneficial lighting conditions (less use of hypnotics and sedatives thanks to more stable sleep phases) into account, the installation is relevant not only in medical but also in economic terms. According to current demographic trends, i.e. more and more people will live for a longer time, this approach will increase in importance in the years to come. Zumtobel will continue to conduct research in this field, the results of which will be reflected in new lighting solutions – to improve people's well-being.

Zumtobel white paper on the study

Zumtobel is a leading international supplier of integral lighting solutions that enable people to experience the interplay of light and architecture. As a leader in innovation, the luminaire manufacturer provides a comprehensive range of high-quality luminaires and lighting management systems for the most varied application areas of professional interior lighting – including offices and educational facilities, presentation and retail, hotels and wellness, health and care, art and culture as well as industry and engineering. Zumtobel is a brand of the Zumtobel group with its head office in Dornbirn, Vorarlberg (Austria).

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LpS 2012 – 2nd LED professional Symposium + Expo Europe's Foremost LED Lighting Technology Event

From September 25th to 27th, 2012, global key players from the fields of industry and research will be meeting in Bregenz, Austria for the second time to discuss the latest developments in LED technology.

Siegfried Luger – Symposium Director

The LED lighting market is expected to be the fastest growing lighting market in this decade. According to a McKinsey report that was commissioned by Osram, Siemens' lighting division the worldwide lighting market will grow to approximately EUR 110 billion ($159 billion) in 2020, with 80% of that total from general lighting. The global LED lighting market is expected to grow from EUR 7 billion in 2010 to EUR 40 billion in 2016 – a compound annual growth rate (CAGR) of 34%. Further growth is expected with a CAGR of 13% from 2016 to 2020. As a result the LED lighting market will amount to almost EUR 65 billion ($94 billion) by 2020, representing close to 60% of the total lighting market. One of the big challenges during this period will be the translation of research and development projects into reliable and cost effective manufacturing processes. Among other things, forums will be required to facilitate the communication and know how exchange between all the different players in this industry.

LpS (LED professional Symposium) is Europe's foremost LED lighting technology event for lighting experts in industry and research. The symposium covers LED lighting technologies for luminaries, lamps and modules focusing on new system approaches, latest components and the most up to date design methodologies with state-of-the-art solutions.

Siegfried Luger, founder and CEO of Luger Research e.U. made the following comments about the program for 2012:
"After the success of our first symposium, this year the "Call for Papers" resulted in double the amount of submissions. The high quality of the papers made the selection process extremely difficult, but with the help of our advisory board with its two new members, we were able to cover a wide area of subjects and fields of interest.

Due to the excellence of this year's submissions, we decided to incorporate an additional session."

The contents of the symposium are multi-faceted, current and relevant to the subject of LEDs in relation to the Digital Agenda for Europe, research & development as well as industrial and end user applications.

There will be 8 sessions with a total of 26 presentations which will cover topics such as Disruptive LED and Light Conversion Technologies, LED Optics and Electronic Systems Design, LED Production Technologies & Materials, LED System Standardisation & Measurement, LED System Reliability and LEDs in Outdoor Lighting Applications.

All speakers, including the three key note speakers are specialists in their fields and either have an academic or industrial background. Michael Ziegler (Photonics Unit at the EU Commission), Dr. Hans Nicol (Philips Lighting) and Prof. DI Andreas Schulz (CEO LichtKunstLicht AG) will address recent EU initiatives, LED technology trends, strategies for future lighting systems and challenges and opportunities of LEDs in lighting projects.

The speakers will also be available for detailed technical discussions during the event.

The subject of the workshop lead by Prof. DDr. Sergei Ikovenko (MIT) is competitive patent circumvention techniques using TRIZ with examples from LED lighting and other industries. Due to the rapidly growing amount of patent applications which is hindering further research and slowing the development process, patent circumvention techniques become a very important tool to speed up the growth of new technologies.

The Early Bird discount of 15% for delegates is available until June 30th. To take advantage of this offer you can go to www.lps2012.com and register now.

Dr. Gerhard Kuhn, Head of the worldwide team for the BU Solid State Lighting, OSRAM Opto Semiconductors commented at the 2011 event: "*High class presentations and good networking opportunities. It seems that the LpS in Bregenz will become an important meeting place for solid state lighting professionals.*"

LpS 2012 is an ideal forum for discovering the latest developments, exchange ideas with specialists from industry and academia and to showcase products and services at the LpS exhibition. Information about the exhibition is available at www.lps2012.com.

Background to the event
The LED professional Symposium +Expo is organised by Luger Research e.U. The company also publishes LED professional Review, an internationally acclaimed industry magazine that focuses on LED technology and research. The Symposium and Expo will be held for the second year running at the Festspielhaus in Bregenz. The exhibition area for 2012 has been expanded to accommodate the increasing number of exhibitors. The presentations will be held in the "Grosser Saal" which is equipped with the latest presentation technology ensuring a high quality experience. Besides hosting the world renowned annual Bregenz Festival, scenes from the James Bond film, Quantum of Solace, were filmed here.

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Led lighting: less is more

Steve Roberts, Technical Director, RECOM

Stephan Wegstein, Technical Director, RECOM LIGHTING

Despite a growing demand for energy, we all accept the need to protect our living conditions by conserving energy and using our energy supplies more efficiently to reduce energy costs and help guarantee the sustainability of supply.

Europe presents itself as a pioneer in the development of a new era of sustainable energy. Energy conservation programmes have been very effectively promoted so that every citizen is aware of the need to cut greenhouse gas emissions, reduce our carbon footprint and invest in alternative sustainable energy supplies. However, protecting supplies is only one half of the equation; we can also individually help by reducing our own energy demand by using products with a lower standby power and higher full power efficiency.

For more than three decades, RECOM Electronic has been a successful manufacturer of modular power converters, efficient voltage regulators and high brightness LED drivers. We have prided ourselves on high energy efficiency and low standby currents long before "green energy" became a fashionable word or the EuP programme had been even thought of. Our voltage regulators are 97% efficient and our LED drivers lose only 4% of their energy in converting the input voltage to the constant current that solid state lighting (SSL) requires. In our laboratory

in Gmunden, Salzkammergut, we put the durability and reliability of our products to the test. With Austrian precision, we track the constant quality of our products and verify the effectiveness of new designs.

Due to the rapid development in the SSL lighting sector, RECOM has launched a new division: RECOM LIGHTING, a part of the RECOM group that sees itself as a partner for complete, configurable lighting solutions. SSL technology is not just less wasteful, but also safer, more versatile and can offer a better quality of light than conventional lighting. The new RECOM LIGHTING division builds on the solid backbone of energy efficiency power supplies to also offer unprecedented quality and reliability by scientifically assembling all of the elements needed for long-lasting LED lighting systems. Through partnerships with well-known LED, heatsink and lens manufacturers, RECOM LIGHTING is able to offer complete customer-configurable solutions in which every component fits its function.

RECOM: we have had the word "ECO" in our name for more than 35 years!

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RECOM converter modules find applications in all segments of the electronics industry, transportation engineering, medical and now lighting fields. At RECOM, we've always been very attentive to our customers needs, and have invested millions over the past decades in production development, growing our quality assurance lab, and expanding the scope of our worldwide distribution activities.

LED lighting
From revolution to mainstream

By Hans Nikol

Philips Daywave LED Office Luminaire

What began with the insistence of a Japanese engineer, Shuji Nakamura of Nichia Corporation, end of the 80ies, has ended up in a revolution of the Lighting industry not even 20 years later. Back then, while mainstream blue LED Research was centered around a compound semiconductor system focusing on II-VI material systems, Nakamura insisted he could make III-V systems like GaN work. It resulted in the first efficient blue LED which quickly became the center of laser and lighting research in the 90ies. By the turn of the century, an efficient blue laser had been commercialized and first white LEDs appeared on the market. Lumileds, Nichia, Cree, Osram and Toyoda Gosei led the market then, with the Lumileds white Luxeon LED being the first illumination grade lighting product.

Today, white LEDs have reached efficiencies of above 100 lm/W of warm-white, high quality light, equal to close to 30 % energy efficiency. What has never happened in more than 120 years of history of modern lighting before, seems likely now: LEDs can replace virtually all lighting applications, from light bulbs to professional luminaires, streetlighting, automotive lighting and even stadium lighting.

Interestingly, it is in most cases not the underlying LED efficiency that makes the resulting application more energy-efficient than its traditional predecessors but the combination of optics, electronics, and controls. In addition, the long lifetime of quality LED fixtures makes economic payback scenarios more attractive.

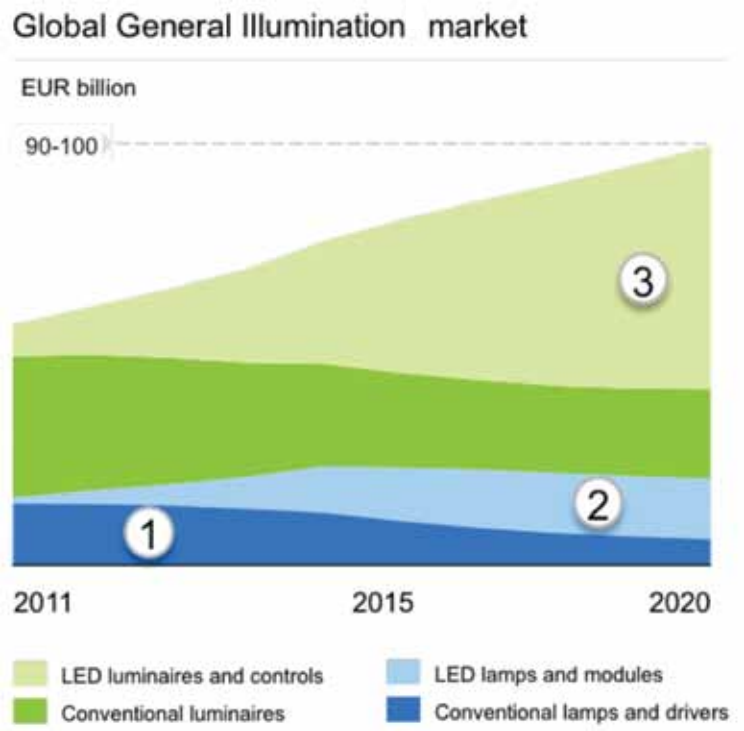
Some selected examples may serve as illustration.

1. **Light bulbs:** While a traditional light bulb in Europe only reaches about 12 lm/W (equivalent to about 3 % energy efficiency), compact fluorescent lamps typically achieve 50-60 lm/W (about 15 % energy efficiency). So by replacing incandescent with compact fluorescent (CFL), 80 % energy savings can be realized – background for the decision of the European Union to phase out incandescent lighting by 2016. An LED light bulb today typically reaches 60 – 70 lm/W, already surpassing CFL. Philips in 2010 has demonstrated the L Prize Lamp with 90 lm/W, winning a 10 mln $ DoE contest in the US in 2011. It is expected that by 2014 light bulbs approaching

100 lm/W will start appearing commercially, double the efficiency of CFL. The light quality is better, the light is immediately on and the shape has returned to the well known incandescent pear shape, with even more design opportunities.

2. **Street lighting:** Until a few years back unthinkable that LEDs would become powerful enough to ever be applied in street lighting, in China today the great majority of all new installs is LED based. Also in the US, parking lot illumination is turning rapidly to LED. The excellent optical properties of LEDs allow, with the help of micro lenses, to guide the light with high precision and low "glare" (light directed to the eye of the user rather than the object to be illuminated) in a precise angle onto the street. In combination with properly designed electronics, LED streetlights outperform many of their traditional peers in lifetime and efficiency.

3. **Office Lighting:** The overwhelming majority today is based on tubular fluorescent (TL) lighting using highly efficient fluorescent tubes with 100 and more lm/W. However, the optical efficiency of the office fixture, depending on its design, reduces the light source efficiency to under 80 lm/W, in badly designed luminaires even to well under 50 lm/W. With LED office panels, designs can be made slimmer and more energy efficient due to better optical designs



Market perspective for global illumination market 2011-20

directing the light onto the desk or office space where needed. In addition, intelligent controls, e.g. daylight sensors or occupancy sensors, can easily be connected to LED lighting, further reducing energy consumption by 20 – 30 %, and boosting the overall energy efficiency to over 50%.

These illustrations demonstrate the radical change the Lighting industry is undergoing, in its intensity comparable to or surpassing other technology revolutions like the transistor or flat panel displays. As design limitations are virtually gone, today's products only give a glimpse on what's on the road ahead.

A series of LED "retrofit" lamps, replacing all socket-based traditional lamps in professional and consumer lighting.

Tailored performance
Optimizing the LED driver

By Bart Kutschruiter, NXP Semiconductors

The development of targeted driver solutions, optimized for specific LED applications, is helping designers increase efficiency, save time, and reduce cost in residential and industrial markets.

The LED driver is a critical part of lamp performance, impacting everything from brightness and dimmability to power efficiency and long-term reliability and safety. The choice of one driver over another is influenced by the application, since a recessed ceiling fixture is very different from a street lamp. NXP Semiconductors offers a series of tailored driver solutions, optimized for specific industrial and residential applications, that help designers increase efficiency, save time, and reduce cost.

For power levels above 25 W, the SSL4101 driver offers excellent power factor (PF) and total harmonic distortion (THD) performance, even for universal mains. When used with the TEA1761 synchronous rectifier, the SSL4101 delivers exceptionally high efficiency, and produces a cost-optimized solution for street lighting, parking garages, area lighting, high- and low-bay lighting, warehouse interiors, and more.

For lower-power residential applications, the SSL2108x/9 are highly integrated, compact drivers that support small, non-dimmable retrofit lamps. The SSL2101/2/3, for replacement lamps that use mains dimming, are compatible with existing triac and transistor dimming units and are among the first to use exponential dimming. NXP supports these drivers with a wide selection of detailed application notes and design guides, as well as reference designs. A free online design tool, developed by NXP, saves even more time, by generating a schematic, a bill of materials, and transformer parameters, and by calculating the design's efficiency and losses.

NXP helps designers use the residential drivers in smart lighting networks, with a complete hardware/software solution that enables IP connectivity. Every light has its own IP address and can be controlled by a smartphone, tablet, or PC. The solution is 2.4-GHz IEEE 802.15.4 compliant, delivers low operating power and low sleep current, and uses a mesh network that eliminates the need for direct line of sight to the wall socket. This lets the network include interior and exterior lights, and makes it suitable for use in larger-scale applications such as parking garages.

NXP's purpose-built driver solutions reflect decades of experience in lighting applications of all kinds, and build on our long-standing partnerships with leaders in the lighting industry. We have dedicated design teams just for lighting, and supply drivers that meet global requirements.

As LED applications continue to evolve, so will our drivers. We are still in the early days of this technology, so next-generation drivers can be expected to deliver even higher performance at an even lower cost. ●

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Visible Light Communication

Broadband Communication from the LED Ceiling Light

by Hans-Joachim Grallert, Head of the Fraunhofer Heinrich Hertz Institute; member of the Board of Governors of EPIC, the European Photonics Industry Consortium.

The Fraunhofer Heinrich Hertz Institute presents a novel form of broadband transmission technology – Visible Light Communication (VLC). Broadband data streams travel via visible light emitted by standard off-the-shelf light-emitting diodes (LEDs) to a computer or other communication-enabled end device. The current broadband capacity of VLC is 100 Mbit/s while speeds of up to 1 Gbit/s have been demonstrated in laboratory conditions. This innovative transmission technology, draws on the energy-efficient electronics of LEDs, and is equally suitable for the dissemination of broadband video streams and bidirectional communication such as video conferencing if infrared LEDs are used for the back channel. VLC can be applied anywhere, where LED technology is used for illumination or signaling purposes – such as in hospitals, at home and in manufacturing environments.

The use of visible light brings an additional advantage: the light cone from the lamp clearly marks the radius of data distribution and accessibility.

Visible Light Communication can be seen as a complement for radio in wireless access, and is attractive for short-range high-speed links in areas where radio is not desired or feasible. Possible uses include optical WLANs or point-and-shoot links in various environments.

VLC benefits from diverse favorable factors, including:

- Omnipresence of LEDs in displays, signaling and illumination
- Significant potential for high-speed modulation by using LEDs as semiconductor components
- Data transfer "piggyback" on illumination (or signaling) to create broadcasting hot-spots
- Add-ons without additional infrastructural components
- No electromagnetic interference (EMI) with radio systems, no e-smog
- Unregulated frequency spectrum (optical frequencies) with worldwide availability
- Simple shielding by opaque surfaces (improved privacy)

As VLC relies on LED lighting, it is highly suited to settings where lights are always on, such as large offices, production facilities, medical areas or public transport systems, including airplane cabins. Yet VLC can also be used for applications beyond communication, such as light design for large halls or indoor GPS data extension.

The fundamentals of VLC were

developed by Fraunhofer HHI in association with industry partners Siemens and France Telecom Orange Labs through the European OMEGA project. From photonic components and systems and fiber optic sensor systems through to high-speed hardware architectures, the Heinrich Hertz Institute works together with international partners from research and enterprise and for global markets on developing the infrastructures for the future Gigabit Society. At the same time, it also develops future applications for broadband networks. Key focal areas of research are 3D TV, 3D displays, HDTV, gesture-controlled human-machine interaction, image signal processing and transmission, and interactive use of media.

www.hhi.fraunhofer.de/vlc

Efficient LED lighting with polycarbonate lenses

Brighter, safer and more resource-conserving

At Bayer's branch office in Vienna, Austria, an innovative facade lighting was achieved with LED spotlights developed by LEDworx GmbH. The purpose of switching to LEDs was to improve the lighting situation in front of the building and create safer walkways with fewer accidents for its employees and other pedestrians. As the photo shows, the new LED luminaires display a uniform illumination of the entire area. And most importantly, these advantages are achieved with a 25 percent lower connected load.

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Light-emitting diodes (LED) are ideally suited for innovative lamp and lighting concepts. Compared to incandescent lamps they are characterized by a low energy consumption and a long service life and are predicted to offer broad application potential, for example in the interior and exterior lighting of buildings, but also in streetlamps, automotive lighting and liquid crystal displays. To ensure maximum light yield in these applications, the light flux can be focused by lenses and light guides made from transparent plastic materials which provide more design freedom than glass.

Bayer MaterialScience recognized this trend early on and has supported it by developing special grades of its transparent polycarbonate Makrolon®. Lenses made from this material are characterized by particularly high light transmission and ensure that the light is concentrated and directed efficiently. They easily withstand the operating temperatures of LEDs and provide excellent stability under LED lighting current.

Furthermore, LED technology offers the possibility of adjusting the color of the light as needed. LED lighting can thus significantly improve contrast and color rendering, which in turn contributes to better vision in a dark environment.

NEW CONCEPT – LED STREET LIGHTS FOR TOWNS OF THE FUTURE

Bayer MaterialScience's experience in the field of polycarbonate LED lenses has also been incorporated into a study on street lamps using LED lenses. The concept was drawn up in conjunction with Cologne-based agency DESIGNquadrat GbR. It came about as a result of public-sector efforts in many European countries to reduce the high costs of powering traditional street lights, of which there are 27 million in operation throughout Europe. Almost all major international light manufacturers are therefore working on concepts for LED street lamps.

The defining feature of the study is the futuristic design of the lamps with their two-leaf floral shape. A photovoltaic cell integrated in the leaf pointing towards the sun further reduces the amount of energy drawn from the public electricity grid to power the lamps, which is already low thanks to the LED technology. The design of the LED lenses shows that compared with glass, polycarbonates offer much greater design freedom for precision optical parts.

Besides their use in brighter street lamps for greater road safety the polycarbonate lenses offer new and exciting possibilities for instance in media facades with moving illuminated displays and special color effects.

Bayer MaterialScience also offers solutions for other LED-based light applications. These include transparent films and sheets with excellent diffusion properties and materials with highly reflective surfaces.

TRIDONIC

1:0 for Tridonic

LED engine STARK SLE turns a fan shop into a world of adventure. Tridonic with headquarter in Dornbirn, Austria is a leading specialist for lighting components, lighting controls, LED modules and LED systems. 2,000 patents in the field of electronic control gear and LED impressively underline this position.

One of the most exciting LED projects with Tridonic is the new BVB fan shop that the German Bundesliga football team Borussia Dortmund opened recently. A key requirement was that the club colours of black and yellow should feature prominently. The decision went in favour of an installation based exclusively on LEDs and comprising TALEXX products from Tridonic because such an installation could meet all the stated requirements.
The lighting system consists of 70 recessed spotlights, 30 power rail spotlights and 27 spherical spotlights. The integrated TALEXXengine STARK SLE have a luminous flux of 2500 and 4000 lumen. All the fixtures are dimmable. The systems are controlled on an application-specific basis with TALEXXconverter LCAI 50/1050 or LCAI 55/1400 which are equipped with an integrated digital interface (DALI, DSI) for control purposes.
The lighting installation is energy-efficient and therefore reduces operating costs. The long life of the LED modules is a major factor here. With a life of 50,000 hours there is no need to change the light sources, which makes the system virtually maintenance-free. This lighting concept also protects the environment. The modules make active contributions to environmental protection in that they contain no mercury, consume very little power, and are associated with greatly reduced CO_2 emissions.
With TALEXXengine STARK SLE Tridonic has developed a system solution with

three perfectly matched components, namely an LED module, an LED converter and a ready-made cabling for connecting the module and the converter, which also means the system is easy to install. These modules offer impressive luminous efficacy. The value is up to 82 lumen per watt for the SLE module. The special technology produces up to 20% greater efficiency for warm colour temperatures compared with conventional phosphor systems for colour conversion. Colour rendering is also remarkable. The entire product series has a CRI in excess of 90 and up to MacAdam 3 SDCM for extremely small colour tolerance. TALEXXengine STARK SLE is available in three different versions – Premium, Select and Classic – which provide ideal coverage for indoor downlight and spotlight applications.

Tridonic, headquartered in Dornbirn/Austria, develops, manufactures and markets equipment for a wide range of light sources, lighting management systems, LED solutions and connectors. Through its active partnership, outstanding service competence and technical expertise Tridonic enables its customers to implement lighting solutions of superior functionality and economy.

In the 2010/11 fiscal year, 2300 employees in 30 locations achieved sales of 437 million euros. More than 250 development engineers create intelligent lighting concepts based on sophisticated systems and products. More than 560 inventions and over 2000 patents are ample evidence of the powers of innovation of Tridonic. Customers include luminaire manufacturers, manufacturers of products that incorporate lighting, architects, electrical system designers, lighting planners, electrical contractors and wholesalers.

The history of Tridonic stretches back more than 60 years and is a success story with many highs. Today, true to its slogan "enlightening your ideas", Tridonic is synonymous with outstanding products and services related to the fascinating subject of light.

For more information go to **www.tridonic.com**.

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LED (Light-Emitting Diodes) A disruptive technology and a new lighting resource

Carlos Lee, Director General of EPIC, the European Photonics Industry Consortium

LED is a highly disruptive technology being adopted rapidly with double-digit growth in Europe and around the world. The driver is perceived added value: **LED present many advantages over incandescent light sources among which lower energy consumption, longer lifetime, improved robustness, reduced maintenance, access to colors, less weight and smaller size.** Market sectors where LED is becoming the lighting technology of choice are: Automotive Lighting, Architectural Lighting, Back lighting units for LCD displays, Signage, Street Lighting.

Commercial indoor lighting represents a major opportunity, but largely unexploited market sector for LED lighting. Today, over 60% of all the electricity used for lighting is consumed by commercial lighting. Indoor commercial lighting is already energy-efficient. Deploying LED by itself may provide a small marginal benefit. But the deployment of intelligent light systems is the clear, single step that will unlock economic added-value for the commercial lighting sector. Success requires a better marketing effort with education and imaginative lighting solutions as well as imaginative financial solutions. The major lighting companies are now beginning to take a more proactive position.

Economic productivity is the result of people at work and people must have light in order to be productive. It is easy to prove that there are lighting conditions that optimize productivity. Intelligent lighting is the concept that seeks lighting conditions that optimize human productivity, in the classroom, in the factory, in the hospital recovery room, on the stage, wherever people are living.

Although intelligent lighting is not a new idea, LED is the first lighting technology that allows the full exploitation of intelligent lighting concepts. This is why LED is different and better than other "green" lighting technologies like compact fluorescent (CFL) or high-intensity discharge (HID) lamps. **LED brings benefits in energy efficiency. However these benefits are secondary when compared to the value added by improved productivity from intelligent lighting.**

There is a strong value-chain for LED exploitation in Europe. Solid-State Lighting (SSL) remains a potential for strong economic growth for European companies like Philips, Zumtobel and OSRAM. However, European companies at all stages of the value-chain could benefit from this development. Let's take a look at leading suppliers of equipment for LED manufacturing: AIXTRON is a world leader in development of production equipment for SSL wafers, and Süss MicroTec is a world leader in the development of processing and packaging of SSL chips. Other European companies are developing and marketing

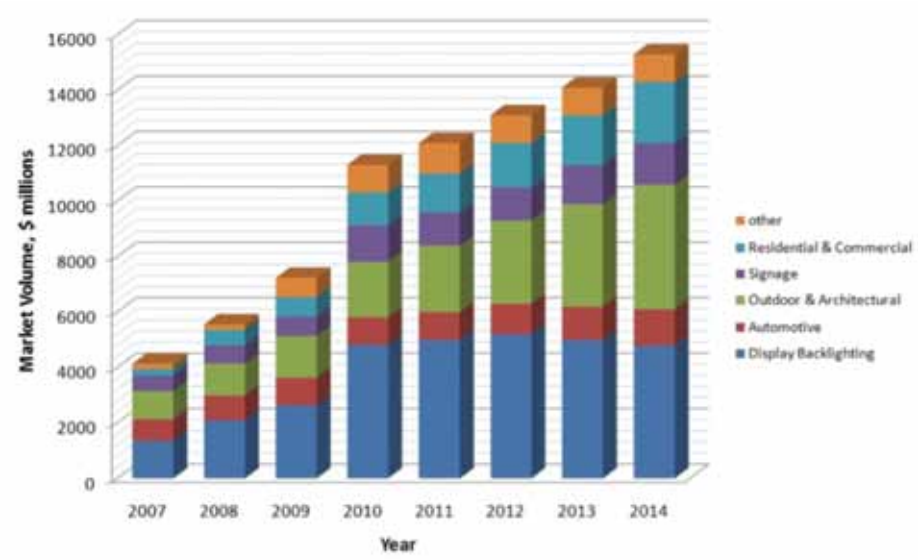
Europe has world leading positions all along the LED supply chain. Pictured is a reactor from Germany based AIXTRON, world leader of MOCVD equipment used for LED Manufacturing.

production equipment enabling solid-state lighting. With the expectation that SSL will be a dominant lighting technology world-wide, it is clear that today, we are just "scratching the surface" concerning manufacturing tools and processes. The transformation to mass manufacturing will stimulate the development of an entire generation of new process tools. This is a significant European opportunity for SSL manufacturing.

The European SSL industry could develop profitably during the next decade by focusing on:

- Luminaire manufacturing: there are several strong and innovative luminaire manufacturers.
- Lighting design: Europe is a leader in design of smart lighting systems that integrate new technologies.
- Ultra high reliability electronics.
- Smart Lighting systems: SSL + IT + Sensors.
- Rethinking the electricity grid: this is an economic and intellectual opportunity of the same level as the development of the internet.

The revolution brought on by SSL will cause lighting to be used in applications that no one can even imagine today!



High-Brightness LED revenues from 2007-2014, based on EPIC research. The outdoor and architectural lighting sector were the fastest growing in 2011.

Public procurement driving growth

By Malcolm Harbour MEP.

We need far better opportunities for businesses developing new technologies to benefit from the public sectors' enormous buying power. Public procurement accounts for 19 percent of EU GDP, yet this spend is still not readily available, in particular to small and medium sized enterprise (SMEs) with a high growth potential. There is a real need for governments, the wider public sector, and Universities, to work up research and innovation programmes targeted at developing new solutions to the problems caused by growing demand, frozen budgets and shrinking energy resources.

Successful businesses for their part must also drive the delivery of innovative proposals for quality, efficient and modern public facilities and services. Public bodies tend to be risk averse and do not have the culture found in our most innovative enterprises. But innovation and efficiency are now desperately needed attributes for spending taxpayer's money better. Up to now, good practice in public procurement is being stifled by complex and expensive regulations but changes recommended to the EU rules will cut red tape, promote efficient solutions, and help reduce environmental impacts.

The European Parliament committee on the Internal Market, which is responsible for EU law on public procurement has been advocating reforms since 2009 to make the procurement process more effective, more focused on innovative service delivery and the smarter procurement of goods. We need a framework which improves opportunities for entrepreneurs and delivers more choice and better quality for citizens. As a result, the Commission has proposed a major reform of the existing rules, which the committee is now examining. This involves sweeping simplification and more flexibility in applying the rules. We especially welcome a new tool to foster the creation of Innovation Partnerships which will encourage public buyers to set ambitious outcomes and work with suppliers to develop and implement new solutions.

This major reform will encourage public bodies to look at whole lifecycle costs in public procurement and consider factors other than lowest price in award criteria. Taking the example of electric lighting, the immediate savings from chosing at the point of purchase, cheaper but more energy intensive lighting solutions, are dwarfed by the significant savings derived from the reduced energy consumption of LED lights. This is compounded by the far higher

and efficiency

durability of LED lights, which brings down replacement and recycling costs overall. On a lifetime cost basis, the case for new technology is clear and will clearly prove to be the most economically advantageous tender (MEAT). The same can be said for promoting photovoltaic installations to offset the costs of lighting and other electrical hardware used in public buildings. Although these costs may be recouped over a longer timeframe, with even the shortest lived public buildings lasting for at least 30 years, the "MEAT" solution would prevail. Instruments such as the EU voluntary ECO management and audit scheme (EMAS) can help sharpen procurement cost calculations when it comes to facilities management.

The public sector needs a change in culture to fully embrace the practice of presenting initial requirements to business, and include them in devising innovative and optimum final specifications. This is where an innovation partnership procurement can come into play. It is imperative that public bodies entrust innovative enterprise to come up with the answers rather than attempting to micro-manage and specify every detail in isolation. We must open up new opportunities for suppliers with great technology to be able to deploy them in public applications. SMEs must be encouraged to tender for public contracts, public bodies should also consider the way in which they might divide contracts up into lots with the advantage of widening the pool of innovative SME suppliers and specialist companies offering more efficient solutions.

This legislative reform, accompanied by new European and national schemes to support innovation in public markets, will open a new era in EU public procurement. The rules must support good procurement, and no longer be a constraint on good practice. Public markets must now open the doors to new technologies and not shelter behind outdated administrative practices.

Malcolm Harbour MEP

Malcolm Harbour was elected to the European Parliament in June 1999, and re-elected in June 2004 and 2009. He is one of 3 Conservative members representing the West Midlands Region of the UK. He is Chairman of the Internal Market and Consumer Protection Committee and is a Member of the European Conservatives and Reformists Group. He is Vice-Chairman of the Parliament's Science and Technology Options Assessment Panel (STOA) and a Member of the Inter-Parliamentary Delegation to Japan.

Malcolm Harbour takes a special interest in the EU single market, industry, science and technology policy. He is Chairman of the European Manufacturing Forum, the Ceramics Industry Forum and the Conservative Technology Forum. He is a Governor of the European Internet Foundation. He has been the lead MEP (rapporteur) for major legislation on Telecoms, the Single Market and Motor Vehicle standards.

Since 2005, he has served on the CARS 21 High Level Group, a Europe-wide initiative to boost the automotive industry. He was named as a top 50 European of 2006 for his key role in broking agreement on the Services Directive. In May 2006, he was named the UK's most Small Business Friendly UK Parliamentarian by members of the Forum of Private Business. In September 2010, he was voted Internal Market MEP of the Year.

Before his election to the Parliament, Malcolm Harbour spent 32 years in the motor industry, as an engineer, a senior commercial executive, a consultant and a researcher. He began his motor industry career in the BMC Longbridge Plant as an Austin Engineering Apprentice in 1967.

Malcolm Harbour was born in February 1947. He was educated at Bedford School and Trinity College, Cambridge, where he graduated in Engineering, and at the University of Aston where he gained a Diploma in Management Studies. He received an Honorary DSc from Aston in 2008.

Light in public spaces

By Eva Hjälmered, Head of Secretariat, UBC Energy Commission

The Rudolf Tarnow School in Wismar. Photo: Dr Henrik Fanger.

Lighting effects how we feel, what we feel and how we perform at work. Providing street lighting is one of the most important – and expensive – responsibilities of a city! Inefficient lighting wastes significant resources each year, and poor lighting creates unsafe conditions.

POSSIBILITIES/LIMITS

The new technology of LED can improve the lighting technology, and the electronic control system. The reliability of the new technology is getting better, the urban light can be controlled in a dynamic way, the control of spilled light is better. When formulating a new standard increasing the safety, security, orientation, identity and the architectural and aesthetical aspects play an important role.

The future of the LED technology is and will be closely linked with the future of the city and how a city will grow, morph and evolve to accommodate not only the new technologies, advancement in science but also our changing lifestyles and expectations. A living and breathing city, a city with dynamic lighting concept makes it possible to reduce the energy consumption without reducing the quality of light.

THE USERS' NEEDS ARE BECOMING MORE CENTRAL

Elderly people require more light during the night for the same functions as compared to younger or middle aged people. Similarly people with some sort of visual impairment would also require higher light levels to perform the

functions when compared to an individual with normal visual abilities. The public and urban lighting currently does not take into consideration these special needs and requirements. Mainly due to the fact that the conventional lighting technology does not offer the possibility to adapt to such needs.

The decisive factor for the design of a lighting installation is not only the location but also the kind of the users, their different intentions to use a space, the time of the day, the surrounding environment, etc. For each project the composition of the set of demands and restrictions is unique and has to be addressed for the specific situation.

The Rudolf Tarnow School in Wismar. Photo: Dr Henrik Fanger.

QUALITY – LIGHT AND COMBINING IT WITH THE SPACE

The project has had six different test installations. One of them is located in the German Hanseatic City of Wismar. They chose to light and enlight the "Rudolf Tarnow Schule". The school was going to be rebuilt. Residents of the area, students, teachers and politicians were active in the process and the reaction before and after the installation have been positive. The expectations of the new technology are also pretty high. It's a new school with new technology. Especially the schoolyard was meant to be used to show that the area is safe and to improve the reputation of the living area.

Politicians even started thinking about further installations in traffic areas. This project this way opened their minds to this new technology. The main effect here is to be seen in the new possibilities that LED offers to use light when it comes to maintenance, attractiveness and energy saving. The real effect here is energy saving. One important insight that was made is that dimming is safer than turning off every second light.

At the parking lot two different LED modules were chosen resulting from the certain standards. In Germany parking lots have to be lightened with white light. The yellow module is instead lightening the pedestrian path.

This is an example of considering the users' needs. What are the requirements? What are the possibilities? What is the potential? Find out more about the installations and the results of the project visit www.ledlightproject.eu.

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