EnergyWatch

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Merry Christmas Everybody

Love is patient, love is kind. It does not envy, it does not boast, it is not proud. It is not rude, it is not self-seeking, it is not easily angered, it keeps no record of wrongs. Love does not delight in evil but rejoices with the truth. It always protects, always trusts, always hopes, and always perseveres.

~ 1 Corinthians 13:4-7 ~

Something to Think About… *Words to Live By – Saint Mother Teresa*

- People are often unreasonable, illogical, and self-centered;
  Forgive them anyway.
- If you are kind, people may accuse you of selfish, ulterior motives;
  Be kind anyway.
- If you are successful, you will win some false friends and some true enemies;
  Succeed anyway.
- If you are honest and frank, people may cheat you;
  Be honest and frank anyway.
- What you spend years building, someone could destroy overnight;
  Build anyway.
- If you find serenity and happiness, they may be jealous;
  Be happy anyway.
- The good you do today, people will often forget tomorrow;
  Do good anyway.
- Give the world the best you have, and it may never be enough;
  Give the world the best you've got anyway
- You see, in the final analysis, it is between you and God;
  It never was between you and THEM anyway.

LED EnergyWatch…

1. ***A Reminder of SSL's Potential*** **-** As SSL performance continues to improve and prices continue to drop, adoption continues to increase. According to the latest DOE *Revolution Now* report, total installation of LED A-type bulbs exceeded 200 million last year, growing 160% over 2014, and they now account for 6% of all currently installed A-type lamps – growth enabled by an enormous 94% reduction in cost since 2008 – with the best-performing 60W-equivalent LED bulbs on the market consuming 85% less energy than the incandescent bulbs they're intended to replace. http://www.energy.gov/eere/downloads/revolutionnow-2016-update

2. **DOE Loan Programs Office (LPO) Opportunity for Solid-State Lighting -** The LPO invests in the power of American innovation to accelerate the deployment of innovative clean-energy projects across the U.S. in order to avoid, reduce, or sequester greenhouse gases. To date, it has supported a large, diverse portfolio of more than $30 billion in loans, loan guarantees, and commitments that have covered more than 30 projects nationwide, generating over $50 billion in total project investment, supporting job creation, cutting pollution, and enhancing American competitiveness in the global economy. Past successful applicants have included solid-state lighting manufacturing projects. The recommended minimum loan amount is $20 million, which covers up to 80% of the project cost. http://energy.gov/lpo/loan-programs-office

3. ***Webinar Posted: Get the Facts on LED Street Lighting*** **-** If you were unable to attend DOE's sold-out October 20 "Get the Facts" webinar on LED street lighting, it's been posted online. LED street lighting has been in the news a lot lately, in the wake of the American Medical Association (AMA) issuing community guidance that cited the potential consequences of increased blue-wavelength light in the night sky resulting from the ongoing conversion of high-pressure sodium street lighting to LED. Both the webinar video and presentation slides are available at: http://energy.gov/eere/ssl/downloads/webinar-get-facts-led-street-lighting

4. ***Why Light Bulbs May Be the Next Hacker Target*** **-** The so-called Internet of Things, its proponents argue, offers many benefits: energy efficiency, technology so convenient it can anticipate what you want, even reduced congestion on the roads. Now here's the bad news: Putting a bunch of wirelessly connected devices in one area could prove irresistible to hackers. And it could allow them to spread malicious code through the air, like a flu virus on an airplane. Researchers report in a paper http://iotworm.eyalro.net/ that they have uncovered a flaw in a wireless technology that is often included in smart home devices like lights, switches, locks, thermostats and many of the components of the much-ballyhooed "smart home" of the future. 11/03 NY Times

5. **NEMA ANSI C78 Committee Revises ANSI C78.1195 -** *American National Standard for Electric Lamps—Double-Capped Fluorescent Lamps—Safety Specifications*. This revision of IEC 61195, ed2.2 (2014-09) includes deviations for clauses 2 and 3. NEMA's Lighting Systems Division, as secretariat of ANSI's ASC C78 for Electric Lamps, is looking for industry experts in the User and General Interest categories to participate in standards development activities. Contact NEMA at nemalighting@nema.org if you are interested. http://www.techstreet.com/nema/standards/ansi-c78-1195-2016?gateway_code=nema&product_id=1934173

6. ***Nobel Laureate Shuji Nakamura Upbeat about Outlook of Micro-LED, Laser Lighting, LiFi Technologies*** - In comparison to OLED, Micro LED does not require filters and polarizer while providing better brightness and superior energy efficiency with longer life time. Two fundamental and crucial challenges are confronting Micro LED technology. First, the size of LED chip impacts on external quamtum efficiency (EQE). The ultra-small chip size of Micro LED means tiny current spreading area and extremely high current density. Second, the sourcing technology, as well as picking and transfer technology of Micro LEDs. Laser lighting is being widely used in projectors, micro projectors, laser TV at 100" and above, laser automotive headlights. In comparison to LED headlights with full beam at 300 meters, laser headlights double the distance at 600 meters. In comparison to Wi- Fi, Li- Fi communication that adopts LED or laser technologies have better transmission capacity. Adding wireless communication and hand-held applications to lighting, say applications of smartphones, could open unlimited development. It's projected that the market value of Li-Fi and visible light communication are to reach $115 billion by 2022. http://www.ledinside.com/

7. ***Lighting Controls Association Adds New Course to Education Express*** - *EE303: Tunable-White Lighting.* LED lighting technology promises many benefits, one of which is practical color output tuning. Popular approaches include full-range, dim-to-warm and white light tuning. Authored by Craig DiLouie, LC, EE303 covers tunable-white lighting technology and application. Students learn color fundamentals and how to select and apply appropriate color-tuning approaches and tunable-white lighting technologies. EE303 is registered with the American Institute of Architects (AIA) Continuing Education System (CES), which recognizes 2.0 Learning Units (LU)/Health, Safety, Welfare (HSW) credits; and the National Council on Quality in the Lighting Professions (NCQLP), which recognizes 2.0 LEUs towards maintenance of the Lighting Certified (LC) certification. To register and take this course, visit the LCA web site at www.LightingControlsAssociation.org and click the Education Express button.

8. ***Pact Puts Circadian Lighting on the Buying List for Thousands of US Healthcare Providers*** - Lighting Science strikes three-year deal with hospital products facilitator Vizient for human centric and other LED lighting products. Irving, Texas-based Vizient Inc. facilitates purchases of about $100 billion worth of goods annually for members including the country's top hospitals such as the Mayo Clinic, the Cleveland Clinic, Massachusetts General Hospital, Johns Hopkins Hospital, and UCLA Medical Center. Those members can now obtain Lighting Science's circadian lighting and standard LED products at reduced rates via the Vizient terms, in a pact expected to be worth millions of dollars to West Warwick, RI-based Lighting Science. The hospitals and other members are free to buy lighting products from vendors outside of the Vizient arrangement. http://www.ledsmagazine.com/

9. ***Energy Star Extension of Deadline for Stakeholder Review of Use of LM-80*** - Document In response to stakeholder request, the U.S. Environmental Protection Agency (EPA) is extending the comment deadline for the ENERGY STAR Requirements for the Use of LM-80 Data to **Friday, December 9, 2016.** The document, along with an accompanying cover memo, is available on the ENERGY STAR Version 2.0 Luminaires page here. Once final, this document will replace the ***"****ENERGY STAR Program Guidance Regarding LED Package, LED Array and LED Module Lumen Maintenance Performance Data Supporting Qualification of Lighting Products"* dated September 9, 2011. Partners and stakeholders are encouraged to submit comments on the document to Lighting@energystar.gov by **Friday December 9, 2016**.

10. ***A New DOE Tool for Lighting Designers and Specifiers*** **-** For lighting designers and specifiers, the LED Lighting Facts Specification Tool provides a customized platform to search and filter products from the extensive LED Lighting Facts database – which now includes more than 54,000 LED lighting products from over 1,400 manufacturers – and manage lighting projects. The tool offers a customized workspace that saves project details with associated products and is accessible to colleagues in same firm. The tool is fast, easy to use, free of charge, and available to all Lighting Pro Partners. http://www.lightingfacts.com/About/LightingPros

11. ***McDonalds Measures Power with Current, Powered by GE*** **-** Current, Powered by GE today introduced a new digital energy management solution for commercial and industrial facilities. The new tool, which is built on Predix*, GE's operating system for the Industrial Internet, is already being used by national customers including McDonald's and Simon Property Group. From lighting to HVAC systems, restaurants, retailers, warehouses and commercial businesses can use the solution to see exactly where and when energy is being used in real time, while powerful software enables not only historic, but also predictive and prescriptive analytics. Increasingly, entities are seeing the benefits of building automation and are seeking out connectivity. 11/15 PRNewswire

12. ***The Era of Smart Lighting Is Coming by Alexander Slagg*** **-** You can add lighting and building management to the list of industries caught in the disruptive undertow of the Internet of Things. The combination of light-emitting diode (LED) technology and Power over Ethernet (PoE), coupled with IoT connectivity**,** is creating a wave of change now hitting both of these industries. Look no further than Cisco Systems, which is partnering with intelligent lighting systems developer Philips and LED innovator Cree on smart lighting. Cisco is launching its Digital Ceiling solution and is targeting organizations that want to harness energy savings and expand centralized control over their office workspaces**.** Bringing IoT insights into everyday work environments promises to deliver valuable efficiencies and innovative productivity gains to how work gets done.
http://www.biztechmagazine.com/article/2016/11/era-smart-lighting-coming

Global LED EnergyWatch…

13. ***Global LED Market to Reach US$33.1 Billion in 2017*** **-** Global LED lighting market will hit US$29.6 billion in 2016 and increase to US$ 33.1 billion in 2017, with a penetration rate of 52%, according to a report by TrendForce. Further, the report said that LED lighting will account for 23% (highest across the globe) of entire lighting in Europe by 2016, due to regional lighting development. Meanwhile, North America and China will become second and third highest regions. However, Asia- Pacific region will witness fastest growth rate in LED lighting, added the report.
http://bizled.co.in/global-led-market-to-reach-us33-1-bn-in-2017/

14. ***Philips Lighting Rolls out World's Largest Smart Street Light Systems in Indonesia*** **-** Philips Lighting announced a city-wide upgrade of Jakarta's street lighting. The project, a significant milestone in Jakarta's ongoing transformation into a smart city, involves upgrading nearly 90,000 street luminaires with energy efficient LED lights connected to a Philips CityTouch lighting management system. The project is on target for completion in only seven months with approximately 430 light points being connected per day. This makes it the world's fastest street lighting retrofit and remote management project undertaken to date. http://www.ledinside.com/

15. ***Towering PoE: Philips, Cisco Wire Madrid Skyscraper with IoT Lighting*** - In one of the largest known installations yet of Power-over-Ethernet (PoE) lighting, Philips and Cisco are wiring the 400-ft Torre Europa in Madrid's financial district with the smart LED technology. Philips said it has equipped 14 of the skyscraper's 32 floors with 5400 PoE-connected luminaires, covering 211,000 ft^2 of office space. The smart lighting installation is part of a major refurbishment to the 31-year-old tower by owner Grupo Infinorsa, which hopes that the modern technology overhauls will draw tenants willing to pay premium rents. PoE lighting routes both electricity and data to luminaires over Ethernet cable, which is the physical line that typically underpins wired information networks in commercial and office buildings around the world. http://www.ledsmagazine.com/

16. ***Osram Invests in Tvilight to Expand Smart Lighting Technology*** - Osram is expanding its expertise in smart outdoor lighting systems for cities by acquiring a minority stake in the Dutch software specialist Tvilight. The lighting maker will hold 47.5% of the company, which offers sensor technology and smart light management software for smart city solutions, among other things. Tvilight offers a platform for cities and other public space stakeholders to realize smart city visions and will continue to provide an open platform for suppliers of smart city solutions. http://www.ledinside.com/

17. ***LED Bulb Prices in China Declined in October*** - LED bulb prices in China have dropped significantly in October 2016, after being steady for the previous two consecutive months, according to a report by TrendForce. The report also said that in comparison to the previous months, both 40W and 60W LED bulbs witnessed 0.6% drop in their global average selling prices in October 2016. The 40W LED bulbs hit US$9.2, whereas the 60W dropped to US$12.6, the report added. http://bizled.co.in/led-bulb-prices-in-china-declined-in-october/

18. ***B2B Penton Sold by PE Owners to Informa Plc in $1.56 Billion Deal*** - It was announced that the UK media company Informa plc has bought Penton for $1.56 billion (£1.18 billion). The deal is expected to be closed by November. Penton (co-owners MidOcean Partners and Wasserstein & Co.) has moved from a mainly B2B print magazine company into an events and information company, similarly positioned as its new owner. Informa Exhibitions has several recognizable event brands including World Of Concrete. If you are not familiar with the show don't laugh, it's a big show. http://www.talkingnewmedia.com/

19. ***Audi Taps Osram for OLED Taillights in Sports Car*** - Munich-based Osram said Audi is using the Osram OLED rear light module in the Audi TT RS, a compact sports car. In July, Osram announced a similar agreement with German carmaker BMW, which is using the OLED taillights in the BMW M4 GTS high-performance coupe. OLEDs are patches of material that emit light across their surface unlike LEDs, which are single points of light. In thin form, they augur a multitude of design innovations. The Audi taillight houses 4 OLED panels, and the BMW has 15, all mounted inside a fitting. OLEDs are becoming increasingly common in gadgets and as television screens. Some enthusiasts believe they will literally work their way into the fabric of clothing, bridges, and buildings, transforming things like fashion and architecture. http://www.ledsmagazine.com/

20. ***Germany's Major Labor Union to Prevent Chinese Takeover of Osram*** **-** Germany's biggest labor union IG Metall has announced that it will block every attempt of the Chinese investors to takeover leading lighting player Osram. This indicates the increasing counter-attack against Chinese participation in Germany's high-tech sector. The union believed that a prospective acquirer may run away with Osram's technology and relocate production to overseas. Chinese investors may still get around rising protectionism measures implemented by the US and EU governments, by forming joint ventures with the firm they want to unite with. http://bizled.co.in/

21. ***Indian LED market to hit 32.15% CAGR in 2021*** **-** LED Lighting market is growing with a whopping CAGR of 57.31% over last five years. According to "India LED Lighting Market Outlook 2021", India's LED Lighting market is forecast to grow at a CAGR of 32.15% over six years. LED Lighting, which accounts for 19% share in the current overall Lighting market, is anticipated to reach 62% by the year 2021. The report reveals that Philips, Surya Roshni, Osram, Bajaj, Havells, etc. are the leading players in India Lighting market and are expected to dominate the market in the forecast period also. http://bizled.co.in/indian-led-market-to-hit-32-15-cagr-in-2021/

22. ***IEA 4E SSL's 7 New Quality and Performance Tiers for LED Lamps*** **-** The governments of the IEA 4E SSL Annex member countries have published seven new and updated so-called quality and performance tiers for seven different LED lamps and luminaires: (1) Non-directional Lamps; (2) Directional Lamps; (3) Downlight Luminaires; (4) Linear LED Lamps Replacing Fluorescent Tubes; (5) Outdoor Lighting (Street Lighting); (6) High/Low Bay LED Luminaires; and (7) Planar Luminaires. These seven documents offer policy makers and program administrators guidance on which parameters to consider and the levels that may be appropriate when specifying or regulating LED products. Parameters include efficacy, lifetime, light color, durability, and many other metrics. http://bizled.co.in/iea-4e-ssls-7-new-quality-and-performance-tiers-for-led-lamps/

23. ***In War Over OLED, Samsung, LG's Investments to Hit US$11.6 Bn*** **-** With the aim to win new orders for Apple's iPhone, leading Korean players Samsung Display and LG Display are set to battle it out in the flexible OLED leadership domain by investing on a massive scale. Their combined investment in flexible OLED will reach a record high of US$11.6 billion in 2016, according to a recent analysis. Apple plans to adopt flexible OLEDs for its next-generation iPhone 8, which is rumored to hit the market in 2017. The iPhone is one of the best selling smartphones across the globe with 200 million units being sold each year. OLED panels will surpass half of total panels for the iPhone by the beginning of 2018, according to industry experts. http://bizled.co.in/in-war-over-oled-samsung-lgs-investments-to-hit-us11-6-bn/

24. ***Samsung Buys Harman to Counter Apple, Google in IoT Market?*** **-** Aiming to revolutionize the Internet of Things (IoT) domain, and make long-term growth in the auto technology market, Samsung has acquired car audio and electronics manufacture Harman, which is the parent company to Martin, a provider of lighting solutions. Samsung has been investing in the IoT as more and more lighting firms see good business in this domain. The acquisition deal has been signed at $8 billion as a part of the company's business strategy. http://bizled.co.in/samsung-buys-harman-to-counter-apple-google-in-iot-market/

LED TechnologyWatch…

25. TCP Flat Panel LED Luminaires Now Available - TCP LED Flat Panel Luminaires are a cost-effective, high-efficiency alternative to T5, T8 and T12 linear fluorescent troffers. The Flat Panel Luminaire features a lightweight, slim low-profile design with a long 50,000 hour rated life. Innovative edgelit technology paired with an acrylic light guide and a thin, frosted white diffuser allow the TCP Flat Panel to deliver full panel diffusion and uniformity. Available in 1x4, 2x2 and 2x4 sizes and 3000K, 3500K, 4100K and 5000K color temperatures. These luminaires are an ideal choice when replacing product in T-grid applications, as well as surface mount, drywall and suspended mounting applications. http://www.tcpi.com/business/products/luminaires/flat-panel-luminaires

26. Crestron Introduces New In-Wall and Centralized 0 – 10V Control for LED Lighting - The Cameo® Wireless In-Wall LED Dimmer (CLW-DIMFLVEX-P) placeholder is designed for dimming 0 – 10V voltage light and is easily installed in any standard 1-gang wall box. Versatile and affordable, it features field-replaceable engravable buttons, and can be configured with various button layouts and designer colors. Easy to install, these dimmers are perfect for retrofit applications. There's nothing in the ceiling, no centralized cabinet. White LED indicators make it easy to find in a dark room and provide visual reference of current dimming level. The dimmer is available in 120, 230, and 277V models. The In-Panel LED Dimmer Module (CLX-2DIMFLV8) placeholder enables centralized LED dimming and control of any load type (forward or reverse universal phase and 0 – 10V) with a single cabinet. www.crestron.com

27. Ushio America Introduces the New Uphoria™ Edge LED MR16 Lamps - Available in ENERGY STAR® certified 5W and 6.5W models, these lamps offer an energy saving alternative for 35W to 50W halogen lamps with improved efficacy compared to their LED predecessors. With the form, fit and function of traditional halogen MR16 lamps, these dimmable LEDs are lightweight with a smooth reflector design and provide 85-87% savings on energy costs. The Uphoria Edge series of premium LED MR16 lamps are damp location rated and are available in flood beam spreads. These unique designs cool the lamps without the use of heat sink fins providing a sleek, modern look while still maintaining a quality light output and ensuring long life. All Uphoria Edge LED MR16 lamps operate on 12V in either a Soft White (2700K) or a Warm White (3000K) color temperature with a 3-year warranty. For more information, visit http://www.ushio.com/products/general-lighting/led-directional/uphoria-edge-led-mr16.php

National EnergyWatch…

28. Trump Likely to Be a Plus for the Construction Industry - The election of Donald J. Trump appears to be a welcome development for the U.S. construction industry, according to forecasters at Dodge Data & Analytics. With his background and experience in construction and real estate development, President-elect Trump understands the important role that construction plays in the growth of our economy and the vitality of our cities. President-elect Trump's emphasis on upgrading and developing public infrastructure, including roads, bridges, airports, transit systems and ports will, with the approval of the 115th Congress, bring much needed revitalization to U.S. infrastructure and create favorable business conditions across the design and construction industries. http://ecmweb.com/business-management/trump-likely-be-plus-construction-industry-report

29. Anticipated Pro-Business Tilt in Washington Boosts Current and Future Confidence Indexes - NEMA EBCI panel members, all of whom responded to the November survey after the election results were known, pushed the current conditions index further into positive territory, moving it from 55.6 in October to 57.9 this month. At 73.7, this month's future conditions index eclipsed October's reading of 66.7. http://www.nema.org/

City & State EnergyWatch…

30. 10 US Cities Join NEMA Project to Reduce Energy Waste in Buildings - Ten more US cities have committed to reduce energy waste in buildings by joining the City Energy Project, a joint venture of the Institute for Market Transformation and Natural Resources Defense Council. NEMA encourages communities to implement building energy benchmarking and transparency regulations to encourage economic growth and to sustain local construction and manufacturing jobs. The cities that joined the project recently are Des Moines, IA; Fort Collins, CO; Miami-Dade County, FL; New Orleans, LA; Pittsburgh, PA; Providence, RI; Reno, NV; San Jose, CA; St. Louis, MI; St. Paul, MN. http://www.nema.org/news/Pages/Ten-Cities-Commit-to-Reducing-Building-Energy-Waste.aspx

31. NASCAR Track Debuts Lights with LEDs - One of the oldest race tracks on the NASCAR schedule — and one without any lights for racing — is taking a major step by becoming the first major motorsports facility to install LED lighting. International Speedway Corporation (ISC), which owns Martinsville Speedway in Virginia, will spend $5 million on the project. The project, dubbed "Light Up Martinsville," will provide better illumination, greater flexibility and more efficiency than traditional metal halide lights. In addition to enhancing the fan experience at Martinsville, LED lighting will also enhance the quality of the broadcast for fans watching at home. The lighting solution will consist of multiple structures located around the perimeter of the facility and the infield of the track. http://www.facilitiesnet.com/

32. Meet the Streetlights That Are Powered by Footsteps - A new street lighting system that harnesses energy from pedestrians' footsteps has been installed in Las Vegas in the United States. The foot-powered fixtures were developed by EngoPlanet, a New York based start-up. The street lights are part-powered by kinetic energy generated by footsteps, which is absorbed by tiles installed in the pavement. Solar panels are also used to boost energy levels when necessary. http://luxreview.com/article/2016/11/meet-the-streetlights-that-are-powered-by-footsteps

Monthly Special Feature… *The Lux Two-Minute Explainer: Li-Fi*

http://luxreview.com/article/2016/02/the-lux-explainer-li-fi

What's Li-fi?
Li-fi is a way of transmitting data – including the internet – to devices such as smart phones using visible light from LEDs pulsed at high frequency. Li-fi is a term coined by Professor Harold Haas of Edinburgh-based start-up company pureLiFi. It's bi-directional, unlike so-called visual light communication, or VLC, in which information is broadcast in one direction to devices. Examples of the latter are indoor-location services.

Is it completely new?
Not really. The remote control you use to send instructions to your TV uses invisible infrared light, and, at the other end of the scale, lasers send vast amounts of data down fibre optic cables to provide telecoms and broadband services, so the principle has been around for decades. The advent of LED lighting, which can be switched on and off instantaneously, has enabled this approach to be expanded and piggy-backed onto LED lighting systems.

How fast is Li-fi?
In theory li-fi can perform around 100 times faster than Wi-fi, which would mean you could download the entire set of Star Wars movies in around one second.

Would I notice a difference in my lighting system equipped with Li-fi?
No, because the lights are pulsed at extremely high frequencies which is undetectable to the human eye. It operates at many hundreds of times faster than high-frequency lighting power supplies or ballasts which are used today.

How do devices download information using Li-fi?
One option is to use the forward-facing camera on your smart phone or laptop. In truth, the components required to deploy this technology are much simpler than Wi-fi or Bluetooth. Think about how many devices already have some sort of light-sensing capability to enable functions such as automatic screen dimming. Alternatively, a plug-in dongle with built-in photoreceptor receives the information.

How do devices upload information?
Data in most cases is a two-way street, and although you tend to receive much more data than you upload, the receiving device still needs to transmit data back. Currently, devices requires a plug-in dongle which has an integral infra-red transmitter to send information back to the luminaire. The dongle also includes a photo-receptor to download information. However, if Li-fi gets traction in the market, smart phone and laptop manufacturers may start to incorporate the necessary sensors and software, obviating the need for a separate dongle.

How does data get in to the lighting system?
The luminaire transmitting the data still needs to connect to the internet or network. This could be with an Ethernet connection or using power-line communication, which is basically data sent over conventional mains wiring. Li-fi engineers say the best solution is to have the whole installation as a Power over Ethernet installation, where both power and data is sent along Cat 5 or Cat 6 cables.

What are the advantages over Wi-fi?
The amount of data which can be transmitted over Wifi is limited; the more users or devices which are trying to communicate, the slower it becomes. Ever tried to connect to wi-fi in a busy exhibition hall or airport departure lounge?

Is Li-fi safe?
In many situations Li-fi could be safer than Wi-fi. The radio frequencies used in Wi-fi can interfere with sensitive electronic equipment, for example in medical equipment or hazardous locations found in chemical plants.

What about security?
Light can be made very directional, and obviously can't travel through walls, so to eavesdrop or hack a system you need to be able to see the light.

Can lights still be dimmed when using Li-fi?
In theory, lights can be dimmed to levels undetectable by the human eye and still perform. However, range or network speed may be compromised. The minimum light level for Li-fi to work is around 60 lux.

What are the applications?
These are the sectors where it gets really exciting:
Office Lighting
Power over Ethernet (PoE) – using standard network cables and infrastructure to power lights – is already starting to be used for office lighting. Adding Li-fi would seem a logical next step. This could remove the need for a separate wired data network for computers and phone systems in offices, and reduce the cost and complexity of IT systems, as well as make office layouts much more flexible.
Retail
Trials are already underway with major retailers such as Carrefour and Target using light-based location technology to interact with shoppers' smart phones. The systems under trail at the moment still need a separate connection to the internet via Wi-fi or either 3G or 4G, but adding Li-fi would make the process simpler, quicker and more responsive.
Public areas
Large numbers of people trying to connect to the internet is a nightmare for Wi-fi systems. Equipping lights in railway stations, exhibition venues and public spaces with Li-fi would enable new experiences for visitors and commuters.