



Lighting industry – total transformation

By D Donald, lighting consultant

The latest lighting technologies are producing the most energy efficient and environmentally friendly light sources, and will transform every segment of the market as we know it.

It has been estimated that lighting accounts for 19% of the global electricity consumption; 70% of this is deemed to use inefficient technologies.

This means that it would be technically and realistically feasible to save over one third of the electricity used to light the continents of the world, ie approximately 900 billion kWh, which equates to 450 million tons of CO₂. In South Africa, due to our high utilisation of coal to generate electrical power, our ratio equates 1 kWh = 1 kg CO₂ - double that of Europe, USA and other parts of the world. That means that we should be working doubly hard to reduce our current electrical consumption, not just to assist in our capacity constraints, but the overall effect on our environment.

Many government mandates have already been introduced, resulting in phased bans on inefficient lighting technologies such as incandescent and halogen lamps. Already 70% of the global community has either banned or phased-in a ban on the use of GLS (incandescent globes). Legislation in South Africa, to do likewise, is in progress.

What of the future and how do we ensure and manage conversion to an energy efficient environment?

As stated previously, legislation has been introduced in certain countries, including the United States of America, United Kingdom and Australia; green building energy rated systems such as LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Method) and Green Star Australia, which, based on a number of criteria, including lighting, pre-determine the Watt/per sq metre that a building can use. This affects sustainable sites, water efficiency, materials and resources, as well as innovation in design. The latter plays a very important role in lighting, but is often overlooked when it comes to final selection.

This is being addressed by the Green Building Council of South Africa (SA), which has followed international standards and introduced a rating system for a building's energy efficiency. The aim to make property owners and developers aware of the importance of Green Building Certification as this is soon going to influence real estate markets worldwide, since discerning tenants, due to their own occupancy costs, will want to ensure the energy efficiency of the property that they occupy.

The Green Building Council of SA was formed in 2007. It is a non profit organisation, but already has over 1 000 members, whose goal is to ensure that all buildings are built in an environmentally, energy efficient and sustainable way and lighting will play a significant role in achieving this goal.

What of the technologies that are going to have the biggest influence?

In terms of lighting applications, LEDs (Light Emitting Diodes) will make the biggest impact. LEDs, however, are not best utilised in traditional light fittings. Therefore, in many office applications, luminaires equipped with electronic ballasts and T5 fluorescent lamps will continue to play an important role, particularly as their energy and output performances improve.

Similarly with industrial applications, many solutions will be better served through the installation of new generation metal halide lamps, which can meet energy and performance criteria

It is estimated that in terms of lamp technology, currently Compact Fluorescent (CFL) and Fluorescent (FL) represent 48% of the total lamp usage, with High Intensity Discharge (HID) and Halogen (HAL) at 12% each, followed by the traditional incandescent (GLS) at 8%.

The 20% that makes up the balance is from LEDs, which, according to all the analysts and pundits, will command 80% of all light source sales by 2020 - eight years' time. Many will argue that this will not be,



BREEAM – Building Research Establishment Environmental Design
CFL – Compact Fluorescent Lighting
FL – Fluorescent
GBCSA – Green Building Council of South Africa
HAL – Halogen
HID – High Intensity Discharge
IDM – Integrated Demand Management
LED – Light Emitting Diode
LEED – Leadership in Energy and Environmental Design
R&D – Research and Development
UV – Ultra-violet

Abbreviations

as LED does not suit every application, which, at the time of writing, is absolutely true but with the R&D spend of traditional light source suppliers and the entry of international semi-conductor companies, this projection seems realistic as, overriding some of the application shortcomings is the undeniable fact that the LED technology is a huge energy saver, i.e. 80%+, compared to GLS, and HAL forecast 40% compared to FL. LED technology will dominate by the year 2020.

In addition to their energy saving attributes LEDs are extremely sturdy and offer the longest lifetime of any light source. They do not produce any ultra violet (UV) or near-infrared (NIR) radiation and are totally mercury free.

What market sectors will be most affected by this technology change? The answer is that over time all will be. The only differential will be the rate of change.

Dividing the market sectors into the following, ie residential, hospitality, shops/retail, architectural, outdoor, office and industrial, the latter two will be the last to respond. Estimates are that the rest will be 70% - 80% dominated by LED technology by 2020, with Office and Industrial being 45% - 40% respectively.

In South African terms, that means that by 2020 the lighting industry will be 65% - 70% LED light sourced.

In money terms, at today's rate that equates to an estimated R4,5 billion industry, resulting in 70% of all new lighting sales and retrofits contributing, at a +50% energy reduction, to an overall energy reduction of 35% in energy consumption.

South Africa has already made a large contribution in terms of lighting energy conservation.

Due to an Eskom rebate incentive programme, SA was a world first in converting a fluorescent lighting market from using traditional wound gear to electronic ballasts, resulting in an immediate 25% saving in energy consumption.

This was initiated in 2004 through an Eskom submission made by Voltex as the distribution arm and Osram as the technology partner. The programme was quickly taken up by the majority of local lighting manufacturers, which resulted in savings of over 20 MW being achieved in the first 12 months of its operation.

Technology has subsequently led to increased savings being achieved through improved luminaire design, material enhancement and through the introduction of lighting controls, such as occupancy sensors to the more sophisticated use of daylight harvesting, i.e. controlling light levels through the use of natural light.

If this has all taken place during the last eight years, then forecasts for the next similar period should not be surprising, particularly as, these days, there is a far greater awareness of the need for energy

and environmental controls, and the consequences if we do not apply them.

The LED process is being led retrofits of halogen and incandescent lamps, which forms a major part of Eskom's current IDM initiatives, through a number of financially rewarding interventions. This transformation is being followed by the introduction of what is referred to as LED engines and modules, which can either be used in existing luminaire products, or will allow for new designs to be modelled around them, eventually leading to whole new families of luminaire designs. This will eventually change many aspects of the lighting industry as we know it and will result in what has been a replacement business with a potentially lifetime light source, therefore a lifetime luminaire.

Conclusion

Businesses previously dependent on a replacement formula will have to rethink; new business will be based on applications, design, energy efficiency and engineering all driven by a new technology. Sounds exciting!

Bibliography

- [1] Source: Government Regulations.
- [2] Osram; McKinsey Market Report.



Drew Donald retired in June 2011 after a long career with Voltex Lighting. As chief executive officer of Voltex Lighting, the company assumed a leading role in providing comprehensive, energy saving lighting programmes by creating a dedicated energy services division. In conjunction with Eskom, Drew contributed to converting the market to energy saving luminaires.

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