HARGREAVEHALE

INVESTMENT BULLETIN

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LED: no less than a great revolution in lighting

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The days of the traditional incandescent light bulb are numbered: this is the view of industry analysts and is supported by incoming government legislation around the world. As you probably know, incandescent lighting involves the passing of electricity through a filament in a bulb in order to generate light as the by-product of heat.

Remember the expression about ‘generating more heat than light’? That’s the incandescent light bulb, one of the most wasteful forms of energy expenditure in the world today... and circa 18% of all global electricity expenditure is on lighting. Sources [Wikipedia: Incandescent light bulb] claim that approximately 90% of the power consumed by an incandescent light bulb is emitted as heat, rather than as visible light.

In these modern, climate change and energy efficiency conscious times, the incandescent light bulb is under serious pressure. According to Wikipedia, Brazil and Venezuela started to phase them out in 2005, and other nations are planning scheduled phase-outs: Australia, Ireland and Switzerland in 2009; Argentina, Italy, Russia and the United Kingdom by 2011; Canada in 2012; the European Union by September 2009; and the U.S. between 2012 and 2014. The 100W bulb was recently taken off sale in the UK.

So what are the main alternatives? **Compact Fluorescent Lamps** have really come to the fore commercially in volume since the mid-90s and offer major advantages over the incandescent lamps in terms of longevity (8 to 15x longer life) and superior energy efficiency (using c.20-33% of the power of incandescent equivalents).

But the take up of CFL technology as a replacement for incandescent bulbs has been far from resounding. CFL technology has a couple of key drawbacks: the quality of the light is unattractive to consumers as it is often ‘softer’ or ‘dirtier’ than traditional incandescent bulbs. CFL technology is also particularly ‘ungreen’ as these lamps contain mercury, which poses a toxic question to the disposal chain. In addition, CFL lamps can require a warm-up period before starting.

Enter **Light Emitting Diodes (LED) – otherwise known as Solid State Lighting (SSL).** These are semiconductors that emit light when powered up – chips that shine. LED efficiency versus incandescent (and CFL) is clear. For example, Philips’ forthcoming EnduraLED lamp is a replacement for the very commonly used 60W incandescent bulb and requires a mere 12W to power it – so is 80% more power efficient, given that it has industry standard luminosity. A typical incandescent bulb lasts around 1,000 hours; a CFL lamp lasts around 6,000 to 15,000 hours; but Philips are claiming a c.25,000 hour lifespan for its EnduraLED lamp, and other LEDs can last up to 50,000 or even 100,000 hours.

LEDs have their key advantages:

- they contain no harmful mercury like CFL technology
- they are dimmable and switchable for colour and ‘mood’
- they are ‘instant on’
- they emit no Ultra Violet nor any heat radiation
- they are essentially maintenance-free



Philips’ LumaLED 12W lamp

LED has been taking an ever larger presence in our everyday lives, although you may not have noticed. Many modern cars now feature LED exterior lighting on both headlights and rear tail clusters – most Audis now feature these and their R8 sports car has all-LED exterior lighting, including indicators, with interior footwell and engine compartment also lit by LEDs.



Front LED light cluster of the Audi R8

Other important existing and up-and-coming applications for long life and cost efficient LED lighting technology include:

- Backlighting for LCD TVs (enabling a thinner form factor as well as power efficiency)
- Traffic lights
- Portable lighting
- Signage
- Supermarket lighting (freezers)
- Street lighting
- Tower lighting
- Medical lighting
- Industrial lighting (warehouses, factories, etc)
- Flash on mobile devices

Projections for the increasing penetration of LEDs include the following:

- The global lighting market is c$70bn in value: by 2015, c50% of this will be LED (Source: Photonstar).
- By 2020 LEDs will achieve a 46% penetration of the $4.4 billion U.S. market for lamps in the commercial, industrial, and outdoor stationary sectors (Source: Pike Research).
- The value of the global lighting market is forecast to grow at CAGR 20% by value to 2020, according to Merrill Lynch.

Many roads to Rome….

Here is a selection of quoted plays offering exposure to varying degrees to the lighting revolution in LEDs:

Stock	Market	Price	Market cap	Description
Cree (Medium Risk)	NASDAQ	$67.29	$7.2bn	LED chip maker and acknowledged current leader in white LEDs.
Zumtobel (High Risk)	Austria	€13.27	€577m	Indoor and outdoor lighting (owns Thorn) and offers LED solutions.
Nanoco (High Risk)	AIM	90p	£152m	Production of nano-particles called quantum dots which improve colour tuning in LEDs, especially in backlighting for LCD TVs.
Dialight (High Risk)	LSE	310p	£97m	Assembles and integrates LED lighting systems including traffic lights, street, smart meters and industrial lighting.
Carclo (High Risk)	LSE	157p	£96m	Precision plastics, inkjet technology but also makes exterior LED lights for Bugatti Veyron and other supercars.
IQE (High Risk)	AIM	17p	£76m	Makes epitaxial wafers and other components that underpin LED chips.
Sagentia (High Risk)	AIM	38.5p	£8.4m	Technology consultancy which owns IP/advises in the LED area.
Enfis (High Risk)	AIM	10.5p	£1.6m	LED light engine maker, mainly for the architectural and commercial markets.

Guy Feld June 2010

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Regulatory Disclosure
Guy Feld owns shares in IQE and Sagentia.

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