

Responsible Investment

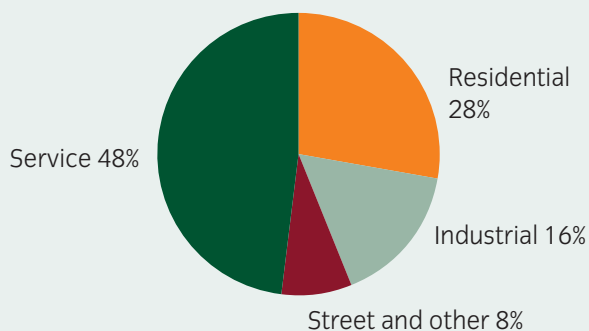
A bright green future for CFLs and LEDs



Introduction

The global lighting industry is in the midst of a significant restructuring, due in large part to concerns about climate change. Lighting – for the service and industrial sectors, as well as for residential use and for streets (see Figure 1 below) – is one of the biggest sources of electricity consumption, accounting for almost one fifth of it worldwide. It is a prime focus for conservation and energy efficiency initiatives.

FIGURE 1: LIGHTING ELECTRICITY CONSUMPTION BY USE



Conventional incandescent light bulbs (which are extremely energy inefficient) used in a range of applications are being replaced with more 'environmentally friendly' alternatives, namely compact fluorescent lights (CFLs) and light emitting diodes (LEDs). This shift is being driven by:

- **Voluntary Initiatives:** Numerous major retailers have committed to phasing out the sale of incandescent light bulbs by 2011, and municipalities across the globe are replacing conventional street lighting with more environmentally friendly alternatives.

- **Regulation:** A provision of the Energy Bill that was signed into law in the US in December 2007 effectively phases out incandescent bulbs within five years, while Australia and Canada have banned these bulbs as of 2010 and 2012, respectively. The EU's 'Eco-design' Directive includes proposals for increasing the energy efficiency of a range of products including domestic, office and street lighting within the next few years.

While CFLs are benefiting from the initial switchover, LEDs are poised to significantly benefit from general lighting applications in the near future.

Weighing up the environmental advantages

CFLs are very energy efficient and increasingly affordable. Although the initial cost of a CFL bulb remains higher than that of an incandescent bulb, a CFL bulb is cost competitive over its entire lifetime. However, CFLs are not without performance issues and their own environmental / human health problems. Users of CFLs commonly complain that the light tones they emit are unpleasant, that they take some time to reach full brightness after being turned on and that they flicker. More worryingly, CFLs contain mercury, a dangerous bioaccumulative toxin that causes severe neurological damage. Accidental exposure to mercury (e.g. through bulb breakage) can result in poisoning. In addition, the disposal of CFLs as 'common' waste can lead to the contamination of soil, air and water. (CFLs need to be treated as 'hazardous' waste and recycled appropriately. Unfortunately, the proper recycling infrastructure and behaviours are not sufficient in most locations.)

A bright green future for CFLs and LEDs

LEDs – semiconductors that emit light – are an even more ‘environmentally friendly’ alternative. They are just as energy efficient as CFLs but do not contain mercury. Their application for general lighting purposes has been limited by several issues:

- **Performance: LEDs are not as bright as incandescent lights and CFLs, and**
- **Price:** Despite the fact that LEDs have a lower cost over their entire life, their initial cost has been somewhat prohibitive.

Significant improvements are being made on both of these drawbacks thanks to rapid technological advances. Consequently, LEDs should be a competitive option for general lighting purposes within the next few years.

The current global LED market is about US\$4.2 billion, a small fraction of the total global lighting market, which is estimated to be US\$100 billion. However, it is expected to grow significantly in the coming years (some sell-side analysts estimate it will grow at 15% per annum). While LEDs look set to benefit from the growth in their application for general lighting purposes in the medium term, the current LED market is dominated by mobile phone applications (approximately half of all LED sales), followed by automotive and traffic information (signals and signs) applications (see Figure 2 opposite). Demand in these areas is expected to remain strong in the near term. Large- and medium-sized liquid crystal displays (LCDs) are other potential areas of near-term growth (e.g. Apple recently announced that it would replace fluorescent tubes with LEDs in its laptop computers; other computer manufacturers are likely to follow suit.).

Investment opportunities

A relatively large number of stocks are exposed to the LED theme. The most obvious of these are the global lighting giants **Philips Electronics** (Netherlands) and **General Electric** (USA). In recent months, these companies have been scrambling to acquire smaller companies specialising in LEDs. **Siemens** (Germany), through its Osram unit, is also a significant player in the LED market. However, as these companies are quite diversified, their LED-related revenues are often not ‘significant’ enough for investors looking to play the LED theme.

Other opportunities may be found elsewhere along the LED value chain. Material and equipment providers such as **Aixtron** (Germany) or **Veeco Instruments** (USA), packaging providers such as **Citizen Holdings** (Japan) and **Bright Led Electronics** (Taiwan), chip makers such as **Epistar** (Taiwan) and **Formosa Epitaxy** (Taiwan), and more vertically integrated players such as **Cree** (USA) and **Toyoda Gosei** (Japan) appear to be well-placed to benefit, as they are highly leveraged to the theme, with over 50% of their revenues being LED-related.

An interesting stock that combines the LED theme with the solar one is **Carmanah Technologies** (Canada), a manufacturer of solar LED lighting for marine, aviation, and street and bus stop light and signage applications.

Conclusion

Given the increasingly strong regulatory drivers in western markets and the likelihood that developing countries (led by China) are likely to follow suit soon, the success of these two more environmentally friendly forms of lighting seems almost certain.

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