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Spot on? – Energy Efficiency Lighting Technology Trends in Asia

Singapore International Energy Week

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ECO-Asia Clean Development and Climate Program
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Presentation Overview

Lighting, Electricity Use, and Impacts – A Review

Energy Efficient Lighting – Technology Trends

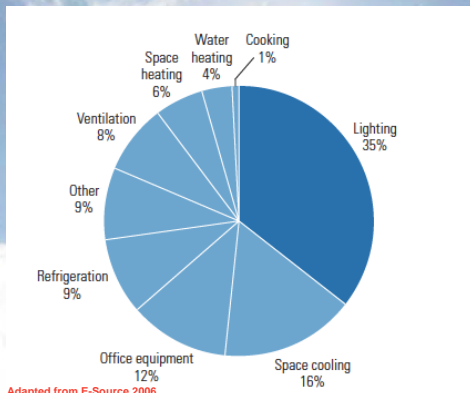
- ▶ Incandescent
- ▶ Fluorescent
- ▶ LEDs
- ▶ Controls & Other Trends

Energy Efficient Lighting – Market Trends & Observations



Lighting and Electricity Use – Overview

About 20% of world-wide electricity is used for lighting
Lighting accounts for 35% of overall building energy use

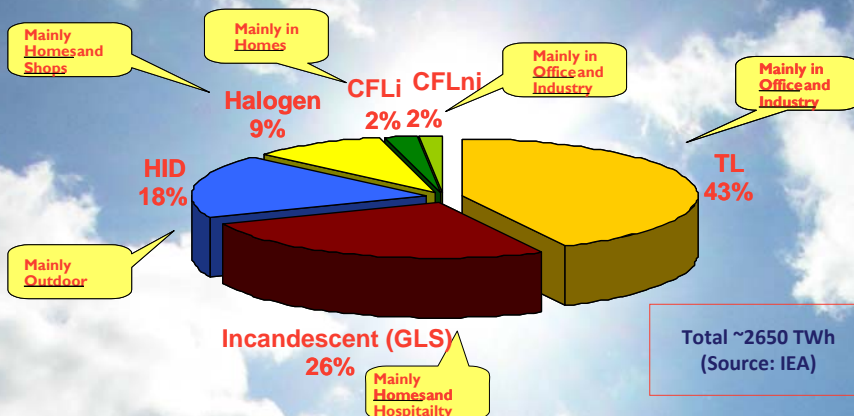


Adapted from E-Source 2006



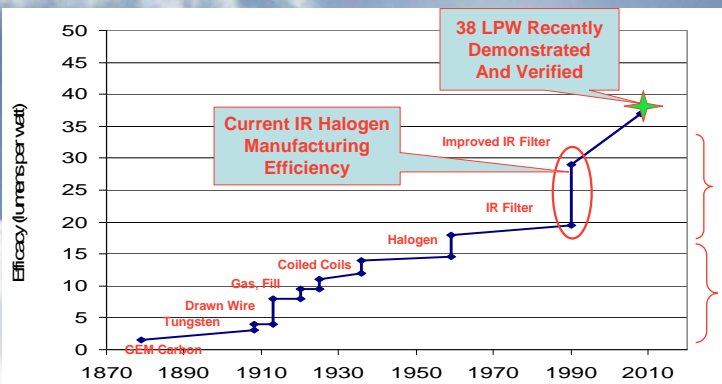
Lighting and Electricity Use – Environmental Impacts

Global CO2 emission from burning fossil fuels for generating electricity used for lighting:





Energy Efficient General Lighting – Incandescent & Halogen Trends



18 years
18 lpw gain

111 years
18 lpw gain



Source: Adapted from "Filament Lamps" by Bergman, Bigio, & Ranish, GE Research & Development Center. Based on 60 Watt, 120V and 1000 hours life



Energy Efficient Lighting – Linear Fluorescent Trends

- Linear fluorescent technology has advanced, with T-5 lamps offering many of advantages over older T-8 and T-12 lamps.
- Significant energy savings have come from replacement of T-12 lamps with magnetic ballasts to T-8 and T-5 with electronic ballasts.
- Technology refinements have shrunk lamp and ballast size and greatly reduced cost over the last 20 years.
- Linear (tube) fluorescent remains the most cost effective commercial and institutional lighting options.





Energy Efficient Lighting – Compact Fluorescent Trends

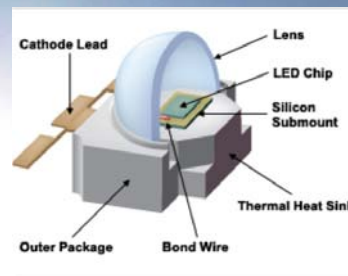
- Technology refinements have shrunk lamp and ballast size and greatly reduced cost over the last 10 years.
- Improvements in electronics, glass coatings & production can increase lamp life, efficacy, functionality, and reduce mercury.
- Significant market penetration in the last five years, due to a combination of increased customer awareness and concerns over climate change, and incandescent phase-out efforts.
- Market is approximately 4 billion units annually, with over 90% of CFLs now made in China



Energy Efficient Lighting – Light Emitting Diode (LED) Trends

Quick LEDs Overview:

- Semi-conductor based.
- Monochromatic, directional
- White light: mixing multiple LEDs or multiple phosphors
- Performance challenging to measure accurately
- Need driver (power supply) & other components
- Need good design for thermal management to obtain good performance and long lifetimes





Energy Efficient Lighting – LED Trends

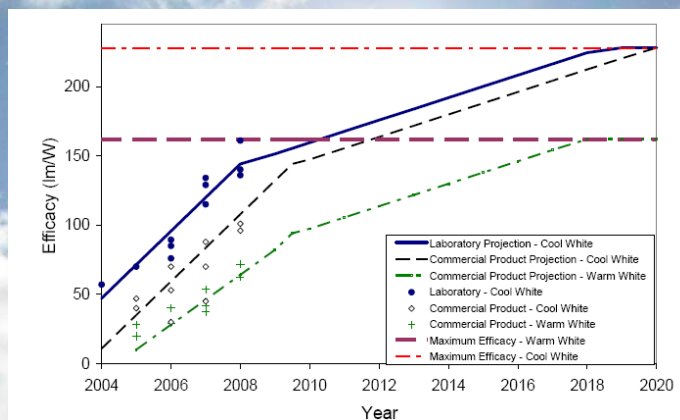
LEDs – Current Status:

- Ready for some commercial applications: Outdoor/street, directional lighting.
- Not yet competitive for general lighting
- Color appearance for general lighting not yet meeting consumer expectations
- Heat removal is still a significant challenge
- Expensive first-cost for many purchasers (\$50-\$100)
- Rapid pace of development



Energy Efficient Lighting – LED Trends

US Department of Energy is projecting 100 Lm/W for commercial warm white LEDs in 2010

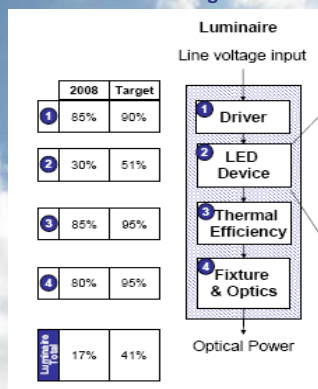




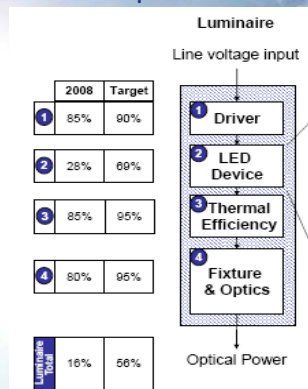
Energy Efficient Lighting – Light Emitting Diode Trends

In actual use, LEDs applications have to overcome other technical challenges:

Color Mixing



Phosphor Based



Energy Efficient Lighting – Controls and Other Trends

Other trends that will affect lighting design & use:

- Day-lighting & other sophisticated controls.
- LEED and other “green-building” certification schemes.
- Low energy density designs.
- Zero energy building designs.
- Stricter energy codes & enforcement.





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Energy Efficient Lighting – LEDs Market Trends

LEDs

- Globally, the high-brightness LED (HB LED) market grew 11% in 2008, reaching \$5.1 billion, with a small decline for 2009.
- Emerging HB LED segments such as backlights for LCD displays in notebook computers and TVs growth remained strong.
- World-wide LED-based lighting market is projected to continue to grow, with lighting and LCD backlighting are seen to be driving the market for HB LED beyond 2010.
- Over the next five years, the market growth forecast for HB LED is at least at a CAGR (compound annual growth rate) of 24%, and is expected to reach \$14.9 billion world wide in 2013.



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Energy Efficient Lighting – LEDs Market Trends

LEDs in Asia

- Total domestic LED applications revenue in China in 2008 was RMB 45 billion (US\$ 6.5 billion), an increase of 50% over 2007, the largest applications being architectural lighting and displays.
- In India, the lighting market is worth US\$1.5 billion as of 2008, of which LED constitutes 3%, or about US\$45 million.
- Other countries in the region can be assumed to follow the Indian LEDs lighting market, constituting about 2% to 3% of the overall market size.
- Based on this 2008 information, the current market size in Asia for LEDs can be assumed to be about US\$ 7 to 8 billion in 2010, of which lighting constitutes about \$US 500 to 600 million.



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Energy Efficient Lighting – Some Observations

- LEDs will be more prevalent in many applications.
- More energy efficient products and options available to users.
- High demand for energy efficient, low-carbon lighting solutions.

But:

- Lack of regional standards for lighting quality can be a major contribution to poor consumer experience in Asian markets.
- LEDs will need careful development to avoid these missteps: Quality standards, procurement specifications, etc.
- No single option can yet replace the incandescent lamp for GLS.
- For many consumer and commercial applications, high-efficiency fluorescent remains the most cost effective choice.



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Lighting Activities:

- **Advocating Product Quality.** ECO-Asia is supporting the Asia Lighting Compact (ALC), an independent organization focusing on product quality for the Asia Region (www.asialighting.org).
- **Promoting Harmonization of Standards.** ECO-Asia supports LITES Asia and other efforts to harmonize regional standards for lighting products and adoption of international standards (IEC) (www.lites.asia).
- **Providing Technical Assistance and Developing Partnerships.** ECO-Asia is working with many national standards body, and is preparing a report on LEDs applications and selection criteria.



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Questions & Comments?

Thank You!

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