Institute for Green and Sustainable Science IGSS'09

Marian University, Indianapolis

Literature assignment 1 - Artificial Light

Use all literature available (including Wikipedia), but apply proper research methods to verify information, and refer to sources appropriately.

Divide labor, then one person will collect data before end of IGSS and write a report.

Include calculations where appropriate (e.g. Mathcad BBR calculations).

Incorporate spectral data collected using equipment available. (DEMONSTRATION)

Discuss your results amongst yourselves. Post results ("mini-reports") to your page on IGSS Wiki.

Topics (example):

1. Human vision, sunlight, and artificial light. Biochemistry of human (and animal/bird) vision.
2. Blackbody radiation and "color temperature".
3. Spectrum of sunlight (G2 star) and (atmosphere-filtered) daylight. Why is the sun's spectrum continuous ("the opacity problem")?
4. History of incandescent light bulbs; choice of tungsten; bulbs with modified spectra; Australian law. (In)efficiency of 2850 K BBR as source of visible light.
5. Fluorescent light - principles (ionization, collisions, etc.); choice of Ar and Hg; choice of phosphors; relationship to UV "blacklight". Efficiency in comparison to incandescents (e.g. use manufacturer claims to estimate overall efficiency)..
6. LED technology and efficiency.
7. Excess (e.g. IR) energy of light bulb and use as heat source (cf. Mackay book).