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A review on Lighting technologies' Energy Efficiency and Environmental Impact

By Somu

Introduction

With the continuous surge in urban civilization, usage of lighting has increased by many folds.

Typical industrial energy consumption by lighting would be 2 to 10 % depending on the kind of industry.

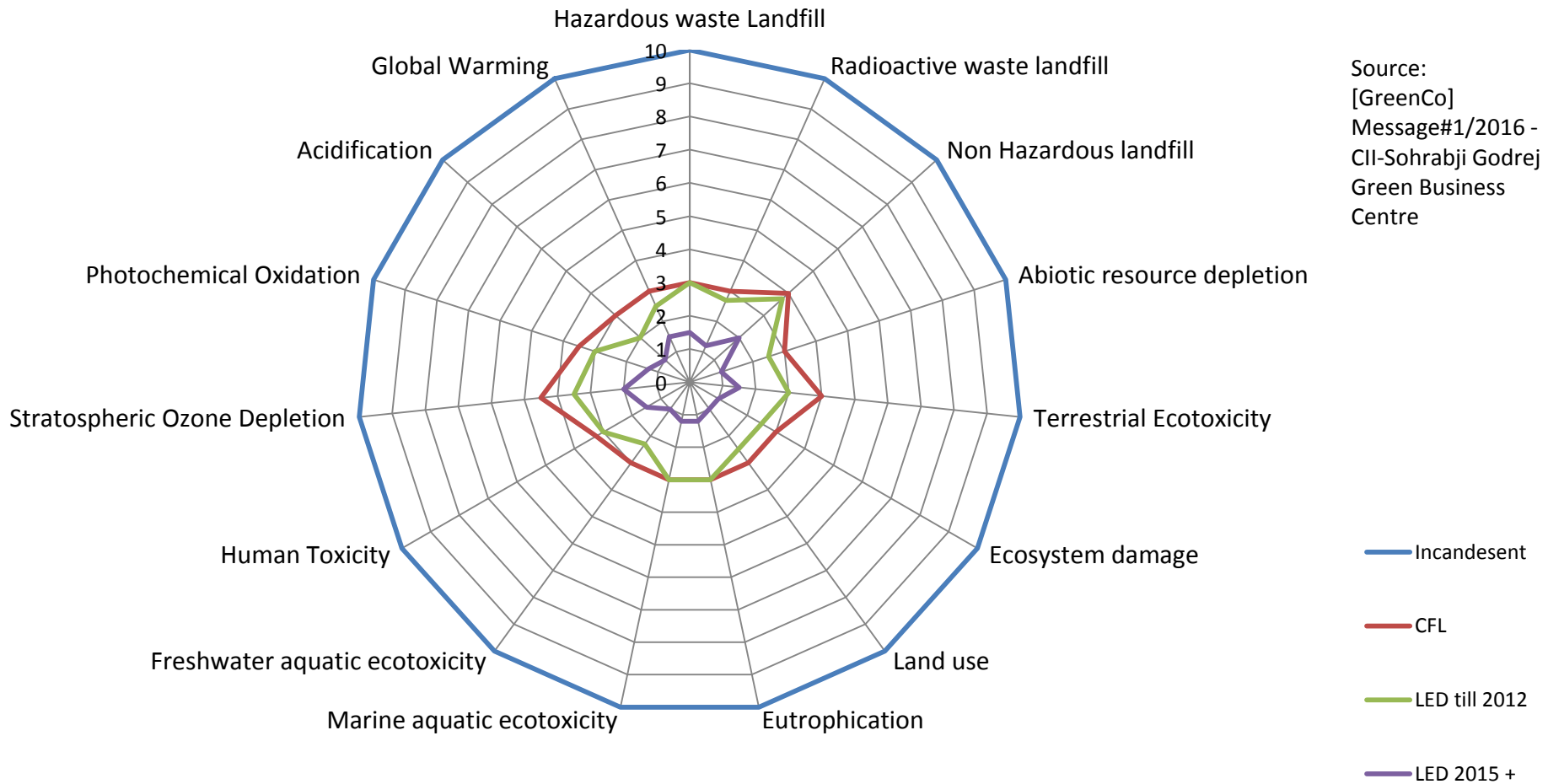
Lighting is essential for working environment and has its role in safety, quality output and wellbeing of work force.

Initial cost of lighting infrastructure would be 15 % when comparing with the overall life cycle cost.

This paper compares the available lighting technologies with respect to parameters like Flux (lumen), luminous Efficacy (lumen per Watt), illuminance (lumens / sq.Mtr) or (Lux), Colour rendering index etc., and at the same time on the different impacts it has over resource, air, soil and water.

The paper discusses about the different approaches adopted for energy efficiency in lighting system keeping in mind also its impact over environment, cost and future technological development in this field.

Available Lighting Technologies and its impact w.r.t incandescent lamp



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Prepared for IAEMP by Balasubramaniam
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Advantage of LED Point:1

Energy Efficiency

- 1. Light-emitting diode, or LED, is a type of solid-state lighting that uses a semiconductor to convert electricity into light.**
 - [?] Today's LED bulbs can be six-seven times more energy efficient than conventional incandescent lights and cut energy use by more than 80 percent**

Advantage of LED Point:2

Life Time

2. A quality LED can have a life of 25K hours or more meaning they can last more than 25 times longer than traditional light bulbs.

- ☐ That is a life of more than three years if run 24 hours a day, seven days a week**

Advantage of LED Point:3

Less Thermal Radiation

3. Unlike incandescent bulbs which release 90% of energy as heat, LEDs use energy far more efficiently with little waste of heat

- Less load to the Air Conditioning System**
- Less discomfort to occupants**
- Again efficiency**

Advantage of LED Point:4

Ruggedness

4. From traffic lights and vehicle brake to TVs and display cases, LEDs are used in a wide range of applications

- **Because of their unique characteristics, which include compact size, ease of maintenance, resistance to breakage, and the ability to focus the light in a single direction instead of having it go every which way**

Advantage of LED Point:5

Environment Friendly

5. LEDs contain no mercury, and a recent Energy Department study determined that LEDs have a much smaller environmental impact than incandescent bulbs.

- They also have an edge over compact fluorescent lights (CFLs) that's expected to grow over the next few years as LED technology continues its steady improvement.**

Advantage of LED Point:6

Continuous tech up gradation

6. Since the Energy Department started funding solid-state lighting R&D in 2000, these projects have received 58 patents.

- [?]Some of the most successful projects include developing new ways to use materials, extract more light, and solve the underlying technical challenges.**
- [?]Most recently, the Energy Department announced five new projects that will focus on cutting costs by improving manufacturing equipment and processes**

Advantage of LED Point:7

Track Record - Proven

7. In 2012, about 49 million LEDs were installed in the U.S.

- Saving about \$675 million in annual energy costs.**
- Switching entirely to LED lights over the next two decades could save the U.S. \$250 billion in energy costs, reduce electricity consumption for lighting by nearly 50% and avoid 1,800 million metric tons of carbon emissions**

Advantage of LED Point:8

Good Prospects

- 8. 1st visible-spectrum LED was invented by Nick Holonyak, Jr., while working for GE in 1962.**
- [?] Since then, the technology has rapidly advanced and costs have dropped tremendously, making LEDs a viable lighting solution.**
 - [?] Between 2011 & 2012, global sales of LED replacement bulbs increased by 22%, cost of 60W LED bulb fell by nearly 40%.**
 - [?] By 2030, it's estimated that LEDs will account for 75 percent of all lighting sales**

Thank You

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