

Using LED lamps instead of low efficiency lights

1. Summary

Lighting is an important application serving a wide range of daily living, manufacturing and commercial activities. Depending on production and business activities, the electricity consumed by the lighting system accounts for a certain proportion of the enterprise's total power consumption. Lighting accounts for about 20-45% of the total energy consumption of commercial buildings and 3-10% of industrial factories. Therefore, energy saving solutions for lighting in enterprises are becoming more critical than ever.

2. Issue

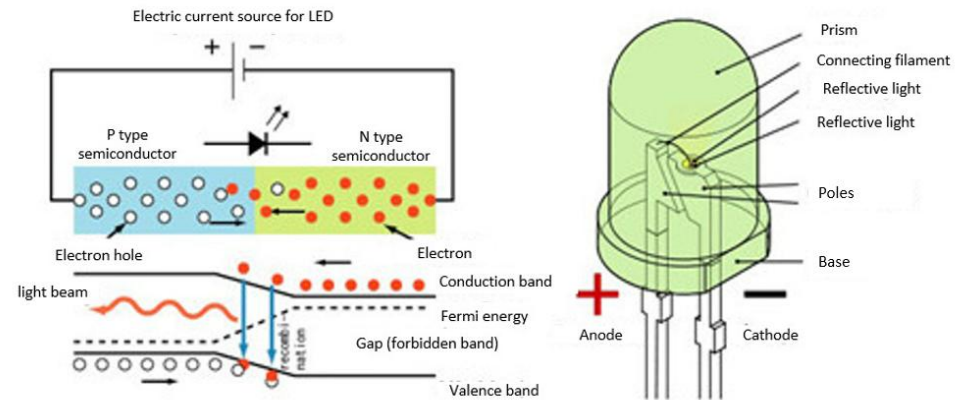
To save costs of energy, some enterprises have switched to the use of energy-saving lighting devices. Today, there are various lighting products to meet many different needs. Lightings are more and more improved in terms of quality and energy saving. Especially, the emergence of LED technology has been offering more cost-saving and environmentally friendly options to consumers. This is a new technology in lighting that consumes less power while ensuring sufficient brightness and aesthetics. The increased brightness helps protect the workers' health and maintains psychological comfort, thus decreases defects in products.

3. What is LED?

LED is the abbreviation of Light-Emitting-Diode. LED is essentially a diode that contains a semiconductor chip doped with impurities to create a P-N junction, with the P channel containing holes and the N channel containing electrons. The electric current transmits from the anode (P channel) to cathode (N channel). When electrons fill up a hole, they produce visible light radiation.

Semiconductors of different structures create lights of different wave pitches. In other words, monochromatic light of different color is created

- **LED Ceiling Light:** with protruding surfaces, larger dimensions,



Structure and operating principle of LED lights



Available LEDs

4. Some applications of LEDs

- **LED Recessed Lights:** is a light embedded in the ceiling, the latest product list imported by the company with reasonable prices, durability, and product quality.



- **LED Bulbs:** With an improved anti-glare plastic casing, the light is

and usually placed on ceilings, LED ceiling light are used for ceilings, hallway ceilings or balcony.



- **LED Tube Light:** is a perfect lighting device with a translucent plastic surface and an aluminum base. LED tube lights are divided into two basic categories: T5 and T8 LED tube lights.



- **LED Strings:** is a string of lights consisting of many LEDs connected together, each LED is a light-emitting point, usually a 1m long of LED string has about 60 LEDs.



- **LED Flood Lights:** is a type of lighting for wide spaces, so this is a modern, energy-saving lighting solution for outdoor lighting.



5. Advantages and disadvantages of LEDs

Advantages:

- Better brightness than other lighting devices

strong enough to illuminate a wide area. Philips LED light bulbs can replace the old bulbs at an affordable price for all families.



- **LED Panel Lights:** are square or rectangular LED panel lights. With translucent mica exterior layer and many LEDs inside, this light is mainly used to decorate restaurants, offices, and living rooms.



- **LED Spotlights:** A light that focuses on a specific area with moderate brightness to provide enough lighting for a decoration.



- **LED Factory Lights:** high capacity, good heat dissipation and capable to withstand continuous working hours in dusty environment. With great lighting efficiency, the product saves more than 80% of energy compared to incandescent light that has the same brightness with the LED headlights.



Currently, LED technology has been developed with high illumination, exceptional service life and continuously decreasing costs. Therefore, we

- Less heat generated than other lighting devices
- Diversity of models
- Various light colors
- Longer service life& high energy saving compared to other lighting devices
- Free from hazardous substances such as mercury, lead, cadmium and radiation.

Disadvantages:

- High initial investment cost
- Many poor-quality LED brands in the market
- Poor quality LEDs blink frequently
- Affected by ambient temperature

6. Application of LEDs in enterprises

Nowadays, many enterprises still use conventional lights with poor efficiency, such as: fluorescent T10/T8> 40W, T5-28W, high-pressure 250W lamp... These are the popular lights used in many factories. Due to the outdated technologies, the system has considerable energy losses, low lighting efficiency, high heat dissipation to the environment and low service life.



should replace low efficiency lights with higher efficiency LEDs.

The following table describes the possible energy savings with LEDs replacement.

Energy saving by using LEDs

Lamps in use	Replaced by	Energy saving potential(%)
Tungsten halogen lamp	LED	75 to 83
Fluorescent tubes		62 to 73
Mixed mercury lights		80
High pressure mercury vapor light (HPMV)		72
Metal halides		64
High pressure sodium vapor light (HPSV)		64

Case study:

A garment factory in Long An province has replaced 620 T8 fluorescent tubes (46W) with LED lamps (18W).

**Cost-benefit analysis table:**

Parameter	Unit	Value
Energy saving	kWh/year	44,442
Cost savings	VND Million /year	84
Investment costs	VND Million	67
Payback time	Month	10