Energy Saving Light Bulbs

Abdullah Al Naqbi, Saif AlDhaheri, and Abdullah Rashid

The Petroleum Institute, Abu Dhabi, U.A.E.
AbRalNaqbi@pi.ac.ae

Abstract

Global Demographic and industrial products increase yearly however such increase leads to an increase in energy demand. In this century, many environmental problems are caused due to the use of fossil fuel as the main source energy production. But these sources of energy produce pollution, which has increased with the energy demand and lead to global warming. This is definitely a very serious problem and dangerous threat human life on the earth (e.g. The Global Warming).

Moreover, these sources are dependable. Thus comes the need of finding the alternative sources of energy undependable, to save this energy which helps the planet from the horrific effects. Solar energy is found to be the best alternative source of energy. This source of energy does not pollute and is considered as a very environmentally friendly energy, which can lead us to a very save environment. Also, it will save this main source of energy which is the oil.

To study energy saving, a study will be conducted and a tower will be an example. The study will show the difference consumption based on the electricity produced by fossil fuel and electricity produced using solar energy. Furthermore, a recommendation on how to reduce the amount of energy on home will be submitted in doing the advantages of some electric components such as lighting, kitchen application and so on.

1. Introduction

We have become so used to having energy whenever we need it that we have been taking it for granted, and more importantly we have been ignoring how it is generated. As a result our energy consumption has been increasing annually. For example American energy consumption has doubled about every 20 years and much of the consumed energy is either unnecessarily used or wasted. Every kW of energy used costs money to produce and thus excess energy consumption is not only a waste of energy but a waste of money too. Wasting energy is also harmful to the environment because even though the energy may not be used effectively it still harms the environment to create it. Our primary sources of energy; fossil fuels including natural gas and coal are irreplaceable, if energy consumption continues at the same rate we will deplete these sources before the end of the century.

Energy consumption is increasing daily as a result of demand generated by factories and people. The purpose of our paper is to study the percentage increases in power consumption for which we will use an office as an example. The power consumed in an office can be attributed to the multitude of machines that are used such as computers, lighting, television monitors, copiers, printers, and faxes. Lighting devices are one of the major sources of energy consumption due to the fact that offices must be well lit and offices in general are lit around the clock to accommodate workers. The graph below shows that 16% of the power consumed in an office can be attributed to lighting making lighting the third largest energy consumer after refrigerator-freezers and computers.

A large energy bill in an office can affect the budget and divert funds from projects. Department of Energy reports that we spend, on average, 5-10% of our electric bills on lighting. Most of the lighting devices that are used in offices are inefficient and consume excess energy. It is very important to keep this point in mind as we often neglect energy consumed by lighting but as demonstrated in the graph above it constitutes a large part of power consumption. Decreased energy consumption resulting from an increase in energy efficiency will lead to a reduction in the energy bill.

2. Background

According to the Abu Dhabi Distribution Company the total energy consumption per day is approximately 100 GWATT. They also noted that much of the energy consumption was due to excess demand by consumers resulting from the use of 180 watt light bulbs in apartments which is generally unnecessary. Jassim Abdullah Saeed; a customer at Carrefour Abu Dhabi has a two bedroom flat, he noticed that at Carrefour the cost of high power consuming devices was generally lower than that of those

devices that consume less energy but consumers were buying the more expensive power saving devices. This prompted him to change many of his home appliances to lower power consuming ones; though their initial cost was high he noticed that his electricity bill decreased after only one month of usage.

3. Data Analysis

Lighting is an essential need of everyday life which is either provided by natural sources of light or by electricity. Using low energy consuming light bulbs will result in lower rates of pollution. Many office buildings use 100 – 60 Watt light bulbs that cost $1 - $3 apiece. Although they may be cheap to purchase they consume more power.

We will use two floors of on office building as an experiment in this paper. It is known that cost of electricity per watt hour is 0.0408$ and that the office shift is 8 hours per day. If each floor uses fifteen 100W light bulbs that are on for 8 hours a day then the total power consumption due to lighting is equal to 8 h x15 lights x100w x0.0408$ for = 489.6$ per day. This company operates six days per week and 288 days per year, thus the total energy consumed by the 100W light bulbs per floor equals $141,005 annually. There are hidden energy costs resulting from the use of these bulbs as they are not 100% efficient as they emit heat which in turn requires additional air conditioning to counter their effect.

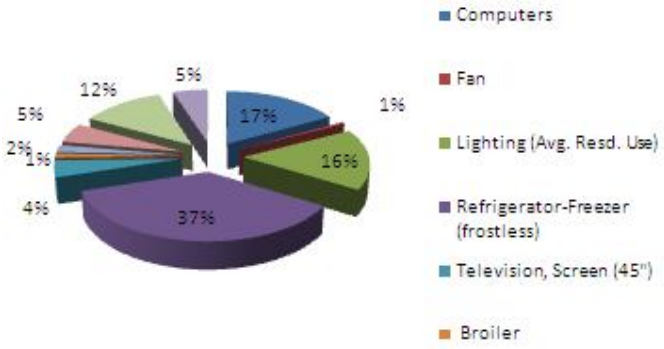

Figure 1. Annual Power Consumptions (kWatts) [1].

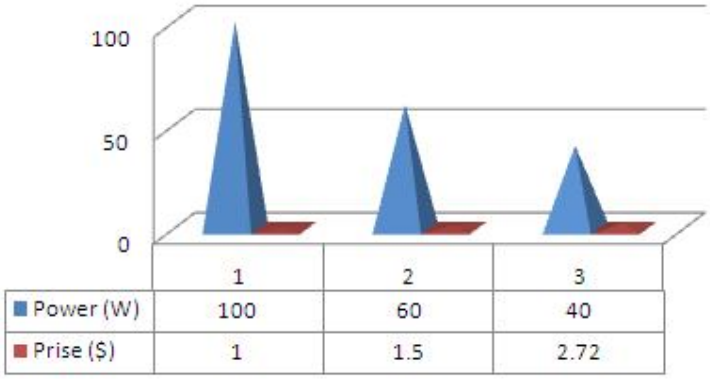

Figure 2. Phips lights cost and power consumption [4].

Figure 3. Energy-saving bulbs [6].

By comparison a energy saving 10 watt light bulb which costs $3.75 per bulb results in an energy cost of $48.96 per floor per day and $14,100.5 per floor per year, which is 10 times less than the cost of operating 100 watt light bulbs. In addition the 10 watt light bulb is 95% efficient which means it only releases 5% of the energy as heat which in turn will reduce the demand on air conditioning. In term of brightness, the 10W has the same brightness as the 100W bulb. Furthermore, the life of 100W is 6500 hours and the life of 10W is 8500 hours. If the company use the 10W light bulb instead of 100W light bulb they will save 126905$ per year in the cost of electricity for one floor as can be seen in Figure 6.

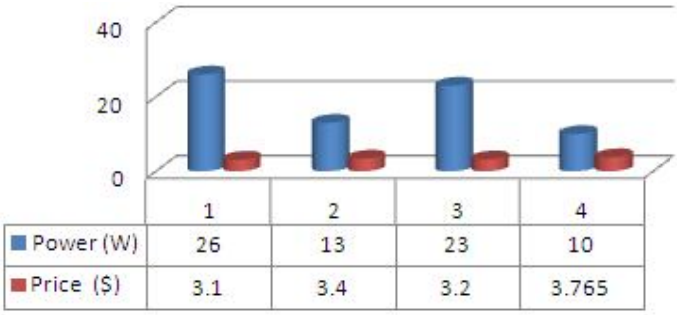

Figure 4. Different side of energy-saving bulbs [4].

Figure 5. Energy-saving bulbs [6].

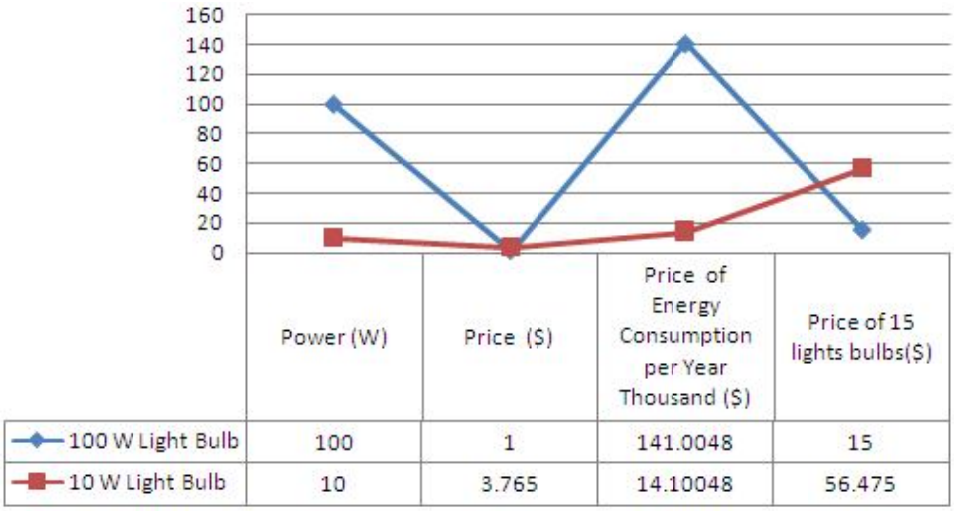

Figure 6. Comparison between 10W energy-saving bulb and 100W incandescent bulb.

Figure 7. Solar Photovoltaic (PV) Electric [5].

4. Recommendations

Even though the electricity bill for this office can be reduced by using 10 watt light bulbs we recommend using Photovoltaic electric systems as they will reduce the energy consumed by lighting to zero. This system costs 5$ per watt so if the power required for the two floors is 300 watts, it will cost $1500 to install the system. This system produce DC power which means that lighting will need to use DC power as opposed to AC power, thus resulting in the need to install an AC/DC converter. This converter costs approximately $2000 thus the total cost of the system is $3500. Therefore, the cost of electricity will zero if the office operates a solar power system. As a result, the cost for the entire system with the lights for the two floors of office space will be 3500$ PV+ 112.95 light + 2000 $ converter + 2000 $ wires and service = 7612.95$.

5. Conclusions

In conclusion, we all know that it's important to save energy. Reducing the amount of the energy we use is one of the fastest, most effective ways to reduce a business' expenses. Moreover, protect your environment, using energy more efficiently will also help to slow the rate of climate change on our planet. Moreover by reducing our energy demand we can protect our environment and reduce the rate of global warming for our planet. Solar energy has been suggested because it one of the most efficient ways to save energy because it is clean, widely available and is renewable. Offices are one of the largest consumers of electricity; the purpose of this paper was to investigate ways to reduce their energy consumption by increasing the efficiency of their lighting systems. Reducing our energy consumption is something we should all strive to do as its benefits are crucial to the survival of our environment and planet.

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Author Biographies

Mr. Abdullah Al Naqbi, **Mr. Saif AlDhaheri** and **Mr. Abdullah Rashid** are Senior Students in the Electrical Engineering Department at The Petroleum Institute.