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PROPER MIXTURE OF CFL AS AN ENERGY EFFICIENT LIGHTING SYSTEM WITHOUT VIOLATING HARMONIC LIMITS

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Energy is a key word, which is being pronounced all around the world today. The long standing energy conservation theory states that energy cannot be destroyed. However, useful energy sources such as fossil fuels are diminishing and conversion of available energy to useful forms of energy such as electricity also come with a high cost. Therefore, it is the responsibility of all energy users to use the available energy in an efficient way to safeguard the interests of future generations.

This paper discusses electrical energy usage in lighting loads at the University hostels and suggests using CFL lamps to reduce the electrical energy consumption. All student and staff residences of the University of Peradeniya are facilitated with the filament lamps. According to the data sheets, electrical energy consumption by a Compact Fluorescent Lamp (CFL) is equivalent to one-fifth of a filament bulb of the same wattage. However, CFL lamps have inherent drawbacks such as causing harmonic pollution on the electrical system and disposal issues at the end of its life time. Therefore, this study was carried out as a pilot project to analyze the performance on the electrical system when there is a considerable penetration of CFL load.

A survey was done to determine the electrical energy usage of a selected portion of the Akbar-Nell Hall (Akbar Wing) at the University of Peradeniya. The electrical energy usage due to lighting lamps was calculated and measured. Further, this paper discusses the financial saving through experimental analysis and the break point on replacing filament lamps with CFL. Students' feedback reveals that they prefer CFL to filament bulbs due to upgraded illumination and due to the understanding of the basic ideology behind the terms break-point and efficient energy usage.

The experimental study confirmed that CFL has tremendous performance when compared with conventional lighting loads. Further the study revealed that the payback period of using CFL is less than 6 months. The study on harmonic effects showed that, out of every six filament bulbs, five can be replaced with CFL without exceeding the limitation imposed by IEEE 519 harmonic standards.

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