Replacement of Conventional Light Sources with LEDs in Households

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Abstract
The report presented a study of the problems in the replacement of conventional light sources with LED retrofit sources. It was found that due to poorly presented information on the packaging of LED products, they often are not perceived correctly by consumers. This actually repel the people and guide them to products they know, which are mostly incandescent and compact fluorescent lamps. There have been made some recommendations regarding the easy adjustment of LED products in everyday life.
It looked at the economic effects and the replacement of conventional light sources with LEDs. There were made several appropriate conclusions from the study.
Keywords: LED sources, LED replacement, light sources.

INTRODUCTION

In recent years, we have witnessed the rapid development of LED technology and its entry into our everyday life, and more precisely the LED sources. For many reasons it gains increasing popularity but the main are the energy efficiency and the environmental protection.
It was expected that the use of emerging green technologies would lead to higher initial investment costs at an earlier stage, which are still an obstacle to their wider implementation.
Currently, most leading companies put their products on the market without having a clear idea for the average consumer that the new energy-efficient technologies are really such.

The **purpose of this paper** is to present some problems in replacing conventional light sources with LED retrofit analogs, mainly in households.

BODY PART

The implementation of LED technology in the household is accompanied by a number of problems and difficulties. However, there are two main problems arise when replacing conventional LED lighting (so-called “retrofit lamps”):

- Misunderstanding most parameters of LED products by "ordinary" people;
- The price barrier of LED products compared to existing light sources.

The research gives an explanation of the two problems and their possible overcoming.

1. Presentation of the technical parameters

On Fig. 1 and 2 are shown typical packaging of LED products of producers known on the Bulgarian market. If we compare them with packages of other types of lamps (eg incandescent, compact fluorescent, etc.), it is worth mentioning the additional information that manufacturers provide:
- Nominal luminous flux - F, lm;
- Color temperature - Tc, K;
- Modification of the LEDs in the lamp housing;
- Others.

Unfortunately, most of these parameters are not known to non-specialist in the field of lighting, i.e. the “ordinary” people. This leads to difficulties of choosing a light source due to the variety of species and manufacturers in the field of LED products. Often, non competent consultations with store vendors further aggravate the choice. When they recommend consumers with LEDs that do not meet their needs, they often repel them and direct them to their already known light sources (most often incandescent).
In Fig. 1 are packs of widely distributed LED retrofit products. It can be seen that the main focus is on the light flow, the lifetime of the lamp and the warranty period given by the manufacturer. At the same time, basic data that is more familiar remains inconspicuous, which are the power of the lamp (by which it is basically chosen), the color of the light emitted, and others.
However, some of the manufacturers of LED products approached farsightedly and their packages clearly shows the basic data mentioned above (Figure 2). The power of the LED lamp and the corresponding replacement power of the filament lamp are clearly visible. Perhaps this is a better approach from the point of view of consumers, although the analogy is not very accurate.
The color characteristics of the light source are also clearly visible on these packages.

***Figure 1**. Packaging of widespread LED retrofit products*

***Figure 2**. Packing of LED retrofit products with introduced an explanatory text about the power of the lamps*

2. Economic effect of replacing conventional light sources with LEDs

On another hand, non knowing about the economic effect of replacing standard LED light sources from a consumer perspective is also main problem for avoiding LED products, given their higher cost than other light sources.
It was made calculation for an average home where 23 light sources were used. Even in the worst case of replacing compact and fluorescent lamps with LED analogs, the payback period of less than 3 years is obtained. Given the long lifetime of LED lamps (from 5 to 20 years) the payback period is not very high.

Unfortunately, there is a problem for consumers about the initial higher investment for LED products.

CONCLUSION

After analyzing the problems of replacing conventional light sources with LEDs, the following can be concluded:

1. There have been found two main problems in replacing conventional LED lighting (so-called retrofit lamps). These are: ignorance of most of the parameters of LED products by "ordinary" people; Price barrier of LED products compared to existing light sources.
2. Most manufacturers of LED products do not adequately represent the information on their packaging in order to be easily read by ordinary consumers. They include parameter data: nominal luminous flux; Color temperature; Modification of LEDs in lamp housing; Others. At the same time, there is no data on the analogy of the power of the LED product and the replaced light source and the color gradation of the light source.
3. The economic effect of replacing conventional light sources with LEDs is not well known to the average consumer. It is necessary to familiarize consumers with the energy savings that will be realized as well as the payback period for LED products.

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