Journal of Environmental Protection, Safety, Education and Management
2013, Number 1, Volume 1 ISSN 1339-5270

GREEN PURCHASING IN PRACTICE OF BUSINESS COMPANY – CASE STUDY

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ABSTRACT

The paper provides short introduction to green purchasing as a voluntary tool of environmental policy. This tool is primarily designed for state and public institutions, however, authors demonstrate, that the green purchasing principles can be applied in small sized enterprises and advantages of its application are significant both from environmental and economical point of view.

Key words
green purchasing, company, LED lights, skylights, energy consumption

INTRODUCTION

Business companies can contribute significantly to sustainable development that will use their purchasing power to choose environmentally friendly products and services. Green purchasing allows saving money while protecting the environment. Green purchasing gives the opportunity to save materials, energy, reduce the volume of waste and pollution. This paper is therefore focused on the implementation of green purchasing in a small business. In this case study we would like to vividly show how it is possible by applying the principles of green purchasing reduce costs in the business while protecting the environment.

GREEN PURCHASING

Environmentally Preferable Purchasing (EPP) - also known as green purchasing or affirmative procurement - is the procurement of goods and services that have a reduced impact on human health and the environment as compared to other goods and services serving the same purpose. [5], [10] Further, it involves considering the costs and environmental characteristics and performance of a product in all stages of its life-cycle, from product design, development and production/provision, through product use, to the ultimate handling (i.e. recovery, recycling, re-use and/or waste disposal) of whatever remains of the product at the end of its useful lifespan. [1], [8] Many companies have had the perception that green means more expensive. Actually, in many cases, green purchasing can also save money, protect staff and reduce liability. The aim of this paper is to introduce green purchasing as an important tool of sustainable development and show that its implementation even in small company can contribute to significant costs reduction, and enhance human and environmental safety.

CASE STUDY OF GREEN PURCHASING IMPLEMENTATION

Characteristics of the company

PROLI Ltd. is a private enterprise with Swiss participation dealing with the sale of industrial and office interior luminaires (IP20 fluorescent lamps, downlights, fluorescent lamps IP54 / IP65, HID lights, emergency lights) and also exterior lamps (HID lights IP54 / IP65, street lights, light sources and others) with its head office in Košice. The company has two branches in Partizánske and Bočiar. The company represents small businesses because employs eight full-time employees.

Branch office is located in the older sprawling building, which represents the major part of the storage space and the remaining part is made up of office space. Ground plan is shown in figure 1. Storage is inadequately illuminated by daylight, and therefore consumes unnecessary amounts of electricity for lighting with artificial light.

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2013, Number 1, Volume 1 ISSN 1339-5270

GREEN PURCHASING ACTION PLAN

On the basis of action plan for 2013 to achieve economic efficiency and increase energy and environmental performance, the company will install the skylights in storage areas, and replace current neon tubes and halogen bulbs with LED bulbs in both storage and office parts of building. Fig. 1 shows the ground plan of the company.

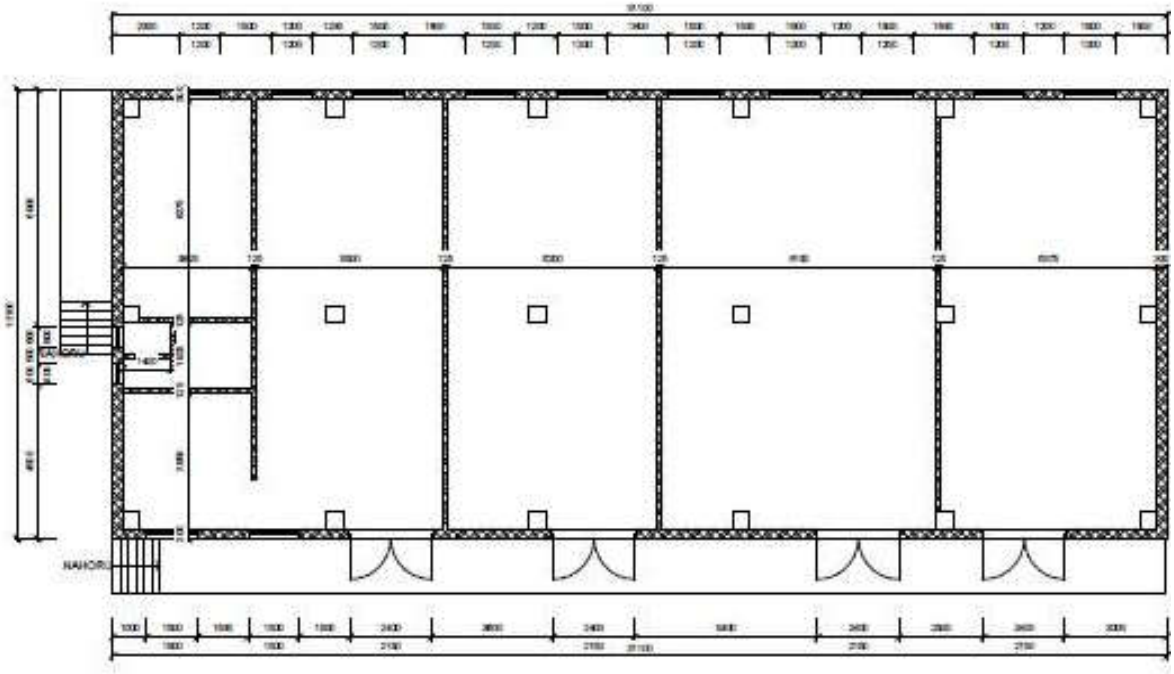

Fig. 1 Ground plan of the company

The monthly cost of electricity consumption for lighting in the company represents a sum of approximately € 100. Table. 1 describes the current state of electricity consumption of lighting in surveyed company. For the calculation we considered ten hour operation of the business six days a week.

Table 1 Current state in electricity consumption

Facility	Consumption per hour (W/h)	Operating hours per year	Consumption per year (kWh / year)
Storage lighting (neon tubes of 50-80W)	4 000	2 880	11 520
Office lighting (35 pcs halogen-45W)	1575	2 880	4 536
Total consumption	5 575	2 880	**16 056**

Table 2 calculates selected economic and environmental characteristics of energy consumption on lighting in the company, such as energy consumption, prices and CO_2 production. Price of electrical energy is set according to energy producer - Východoslovenská energetika a.s. price list for SMEs. [2] CO_2 production is calculated in accordance with regulation no. 311/2009. [12]
It is the regulation by the Ministry of Construction and Regional Development of the Slovak Republic, which determines the amount of produced CO_2 in kg per kWh.

Table 2 Current economic and environmental characteristics of lightning

Facility	Consumption per year (kWh/year)	Price (€/kWh)	Total price (€)	CO_2 production (kg / kWh)	CO_2 production – total (kg/kWh)
Storage lighting (neon tubes of 50-80W)	11 520	0,0672	774,14	0,62	7 142,4
Office lighting (35 pcs halogen-45W)	4 536	0, 0672	304,82	0,62	2 812,3
Total	16 056	0, 0672	**1 078,96**	0,62	**9 954,7**

Implementation of skylights in storage

A significant part of the building consists of storages, which are regularly used. Whereas in the storage facilities are inadequate supply of daylight, indoor electrical lighting is necessary. Lack of daylight is caused by the high buildings in company´s neighbourhood, which prevents the penetration of light through the windows of the storage. Therefore it would be appropriate to implement the skylights that bring daylight and thus reduce unnecessary energy consumption. The installation of skylights does not require planning permission.

Specification of the proposed skylight studied for the enterprise:

- Type of skylight: Silver 800 instant
- Diffuser diameter: 760 mm
- Radiance: 26690 lm (replaces about 13 bulbs 58W/230V efficiency 45% = 2080 lm)
- Lighted area: 40 m^2
- Length skylight: 1.11 m
- Height above surface: 5.9 m
- Light reflectivity: more than 99.97%
- Life: min 25 years
- Reduced energy consumption: 80% (impact of external lighting conditions)

Information on the dimensions of the storage:

Storage consists of four parts, each of which has the following parameters:

- Building height: 7 m
- Width of the hall: 6 m
- The length of the hall: 13.5 m
- Height of skylight above the floor: 5.9 m

Product price

To the lightning of the storage the six skylights will be necessary to install. The price is determined as follows:

- The price of skylight with all the components: € 4,508.60 (price is determined by the price list of Lightway - the best bid corresponding to the requirements of purchaser)
- Assembly: € 540

LED bulbs installation

Analysis of lighting in the company PROLI Ltd. showed that two-thirds of lighting is produced by neon tubes and one third by the light form halogen bulbs. We proposed to replace the original lighting by LED lighting.

LED lighting offers a 100% replacement for the classic, compact and energy efficient light bulbs. 92% of the energy is converted to light and only 8% to heat. In terms of energy efficiency it refers to the A class which represents the highest energy efficiency. LED bulbs are very efficient light sources because light bulb immediately issues not blinking light, does not contain mercury and does not issue or IR or UV radiation. There are different quality versions available in the market. In PROLI Ltd. we suggest the exchange of neon tubes and halogen bulbs for 50 pieces of LED tubes in storage and 35 pieces of LED bulbs in office. Specification of LED tubes is presented in Table. 12

Table 3 Lightning characteristics in PROLI Ltd.

	50 pcs LED tubes	**35 pcs LED bulbs**
Type:	T8	E 27
Input:	24 W (replaces neon tubes 80 W)	4,6 W (replaces 45W halogen lamp)
Dimension:	29x29x1200 mm	60x110x60 mm
Beam angle:	120 °	180 °
Operating life:	35 000 hours	40 000 hours
Light color:	4500 K- neutral white	6500K- daily white
Luminous flux:	2400 lm	400 lm
Led No.:	366 x	6 x 6
Dimmable:	no	no
Price per piece:	42 €	11 €
Total price:	***1932 €***	***330 €***

Environmental characteristics of LED lighting

LED lightings are labeled by energy efficiency class A, are recyclable, meet the European RoHS directive on the restriction of hazardous substances in electrical and electronic equipment [11] (see fig. 2)

Fig. 2 LED lightning labelling

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2013, Number 1, Volume 1 ISSN 1339-5270

Fig. 3 Installation of skylights

Installation of skylights (see fig. 3) can save 80 % of energy spent for lightning of storage, due to external light conditions. The remaining 20% of the operation time, we suggest using efficient LED tubes. Lighting of storage represents three quarters of energy consumption for lighting areas of the building. In the office part we suggest to replace 35pcs of halogen bulbs with LED bulbs.

The following table (Table 4) shows energy consumption after the installation of LED lighting and skylights. Table. 5 shows the new state of economic and environmental characteristics of lightning after installation of LED lights and skylights.

Table 4 New state of energy consumption after LED lightning installation

	Consumption per hour (W/h)	Operating hours per year	Consumption per year (kWh/year)
Storage lightning – new state (50 pcs of LED tubes (24W) + skylights)	1200	576 (20% of current state)	691,2
Office lighting – new state (35 pcs of LED bulbs (4,6 W))	161	2 880	463,7
Total consumption – new state			1 154,9

Table 5 New state of economic and environmental characteristics of lightning

Facility	Consumption per year (kWh/year)	Price (€/kWh)	Total price (€)	CO_2 production (kg / kWh)	CO_2 production – total (kg/kWh)
Storage lighting (50 pcs of LED tubes (24W))	691,2	0, 0672	46,45	0,62	428,5
Office lighting (35 pcs of LED bulbs (4,6 W)	463,7	0, 0672	31,16	0,62	287,5
Total	**1 154,9**	0, 0672	**77,61**	0,62	**716**

Journal of Environmental Protection, Safety, Education and Management
2013, Number 1, Volume 1
ISSN 1339-5270

The following chart shows a comparison of the current state of electricity consumption and CO_2 production of lightning, and new state after installation of LED lights and skylights. The economical and environmental improvement is remarkable.

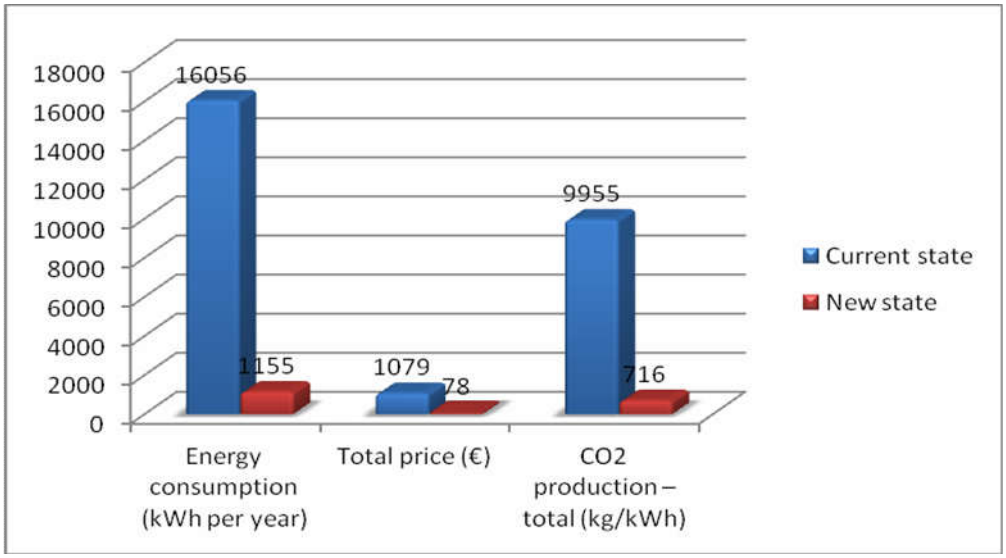

Fig. 4 Comparison of energy consumption, price and CO_2 production

Estimated expenses for purchasing the LED lights and skylights are 7 310 €. Annually this measure will save approximately 1001 €. Therefore we can estimate the return of investment to 9 years. From this point of view it represents a long term investment. This time can be shortened as we anticipate increase of energy prices in the future as well as long operating life of skylights and longer operating life of LED bulbs or tubes than neon tubes and halogen bulbs.

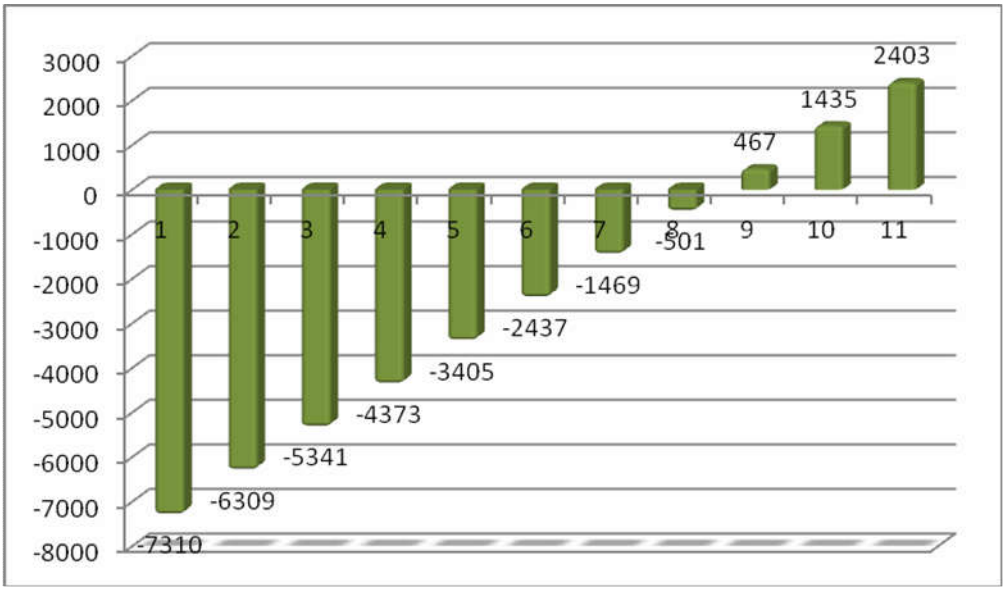

Fig. 5 Return of investment

CONCLUSION

Based on an examination of the current state of the surveyed company, we found that there is a space for the realization of efficient measures. The proposed action plan for green purchasing in 2013, we focused on possibility of increasing energy efficiency of lighting in the company´s building. Applying a proposed action plan will result in saving electricity for lighting in the amount of 93% from current state.
Company would save annually the amount of € 968 and increase environmental efficiency due to reduction of CO_2 emissions production. Return on investment is expected after eight years from the installation of LED lights and skylights. Company should, in the coming years, focus on undertaking further action on improving energy, economic and environmental performance via green purchasing.
We believe that implementation of simple principles of green purchasing can bring the win – win effect – the benefits on economical and environmental side, for every organization.

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Journal of Environmental Protection, Safety, Education and Management
2013, Number 1, Volume 1 ISSN 1339-5270

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