Energy Saving with Electronic Ballasts in Readymade Garments (RMG) Factories

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Background

The concept of eco-efficiency is relevant for achieving more value from a lower input of raw material and energy while reducing environmental emission and its damage. The Pilot project is a follow up on the recommendations of a previous study[1] which showed that a possible option for improving eco-efficiency is through reducing energy consumption for lighting in garments industries. It is noteworthy that productivity of the workers in the production line is highly dependent on the quality of light, therefore much effort should be placed on providing sufficient lighting and maintaining suitable environment for the labor intensive processes.

The main objective of this study was to demonstrate the potential technical, economic and environmental benefits to be derived from replacement of magnetic ballasts (MB) with electronic ballasts (EB) of the Fluorescent Tube Lights (FTLs), in five selected garments factories and quantify the energy savings through such intervention. Because of its design, electronic ballasts operate with lower power consumption for the same illumination or lighting intensity. The net effect of reduced operating costs and fewer replacements could result in 30% cost saving in life cycle cost (LCC). Other technical benefits are (i) the ballasts are designed to have a longer useful life of 30,000 hours in comparison to the magnetic ballasts with 10,000 hours, (ii) usually have wider voltage range for operation from 70V to 250V (iii) no need for using a starter, (iv) lesser lumen depreciation, etc.

Findings

Overall savings in energy consumption from replacement of magnetic ballasts with electronic ballasts has been observed to range from 23.74% to 28.54% in the selected lines of the sample factories. The overall impact on total energy saving can be potentially significant because of large number of FTLs used in each of these factories.

Financial benefit through cost savings can be directly attributed to energy saving from replacement. Assuming an average energy saving of 25%, there is a potential of saving Taka 12.81 per tube light fixture per month. This savings can be even higher if the actual rate of tariff is higher than the generic value of Tk 5.50/ KWh used in this analysis. Factories based on captive power generation, or those using Diesel backup power during temporary power outage are known to have higher rates for unit power generation. Therefore, improved energy efficiency from replacement of magnetic ballasts with electronic ballasts in the FTLs will have higher impact on such cases. Analysis shows that the payback period of such investment is only around 12 months.

National Impacts on Energy Consumption (MWh) and Power (MW)

Typical garments factories use 400 to 6000 tube lights on a daily basis depending on the amount of work load available. Therefore annual savings in operating cost due to replacement with improved ballast can range from Taka 58,000 to 7,26,000. This is a significant part of the overall operating cost of the factories. Assuming on average 2000 FTLs are used in approximately 3000 operating garments factories, total savings in energy consumption per month can reach 14 MWh. In terms of power capacity, this savings can translate into 45 to 60 MW through the replacement of the ballasts only, keeping all other accessories unchanged. This implies that a very significant national savings can be potentially achieved in the long term.

Recommendations Specific to the Study:

Information dissemination through outreach and awareness programs

There is a need for information dissemination through outreach among the management, staff and personnel of the garments industries. This is especially true for the larger composite industries that guide the standards of the garments sector. Demonstrating measures for utilizing modern and efficient technologies will also have long term impact on the economic performances of the factories. It is recommended that an outreach program be developed from within BGMEA and BKMEA to disseminate information on eco-efficiency. The two modes of dissemination can include;

Awareness creating Seminars on improving energy efficiency in the garments industry and its environmental impact. This can include opportunity for saving on power capacity and consumption through the use of electronic ballasts with the existing fluorescent lamps (FTLs) in RMG Factories, and other interventions.

In factory training/capacity building for managers, staff and personnel in RMG industries by arranging lectures on improving energy efficiency. Promotion of “Energy Manager” concepts in the industries.

Up-scaling/replication of intervention phase-wise coverage of all garments industries:

Noting that the payback period of such investment is within 12 months, suitable financing schemes should be offered by the financing institutions to motivate the industries to adopt this intervention for overall national benefit.

Import limitations on magnetic ballast

Since world class high quality electronic ballasts are being produced within Bangladesh, it is recommended that a limit be imposed on production of magnetic ballasts and eventual total stoppage of import of electronic ballasts when the industry is mature.

Ensuring minimum environmental impact

Disposal of replaced magnetic ballasts needs to be taken into consideration, especially when it is done on a large scale. Mechanism for safe disposal of the ballasts should be

accompanied by a scheme for recycling and re-using them for other purposes like domestic and non-industrial use.

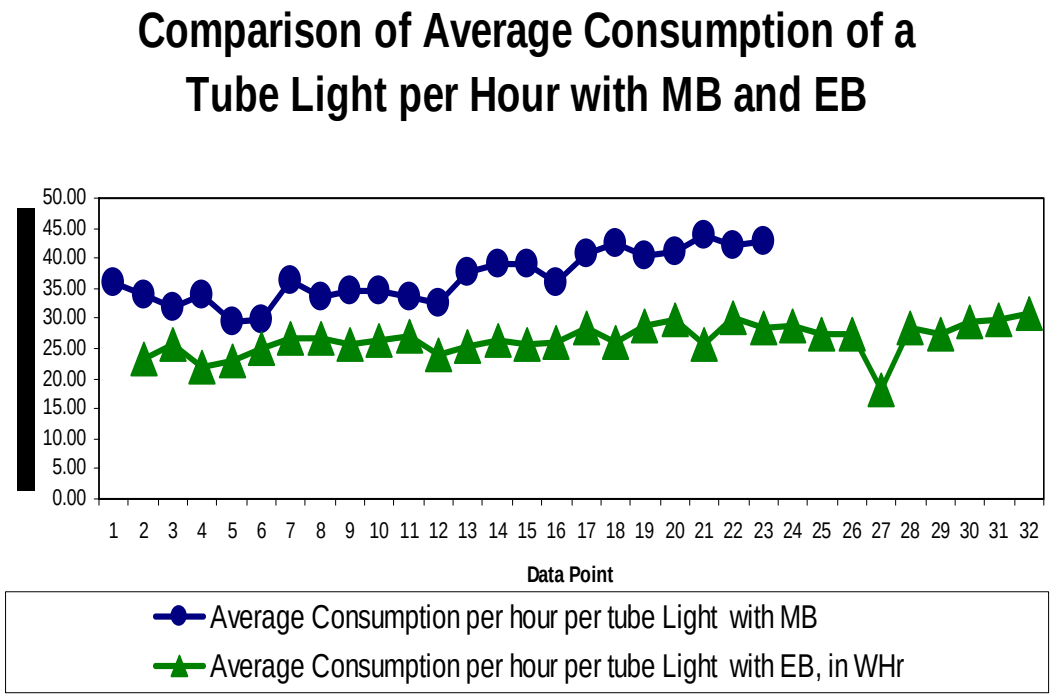
Other Recommendations:

Thermal energy efficiency and conservation

It is recommended that studies be undertaken to assist medium and small garments, dyeing and similar factories for assessment of the scope of (a) prevention of steam loss through leakage, (b) insulation of heated exposed surfaces, (c) condensate collection and (d) implementation of simple measures to prevent such losses in order to quantify overall energy savings and consequent cost saving. In addition, for larger industries, a study should be undertaken to assess installation of Co-generation units, i.e. simultaneous production of electricity and heat using the exhaust heat of captive power plants. During implementation of the present project, a potential for co-generation was noted in a composite factory where a 1 MW natural gas based generator is being used. Energy from the exhaust gas of 600-700^{o} C temperature could be recovered resulting in substantial energy saving. Use of heat exchangers should also be promoted at every possible occasion.

Total water reuse as an energy-saving related measure

It is recommended that the scope of recycling and reuse of waste water following ETP in the dyeing and composite garments industries be investigated as a unique example. Such a study would analyze the international standards and processes undertaken currently, and suggest its adoption for the garments industries in Bangladesh.

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