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**Determining the Reduction of Fossil Fuel Burning and CO<sub>2</sub> Emissions in Textile Industry of Sri Lanka through Sustainable Energy Use**

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**Abstract**

Textile industry plays a major role in Sri Lankan economy but it is an energy intensive industry which releases a large amount of CO<sub>2</sub> to the atmosphere. Therefore, it is important to take sustainable measures to reduce energy consumption and greenhouse gas emissions in textile manufacturing while making efforts to increase the production. This study was conducted considering three textile manufacturing factories in Biyagama Export Processing Zone which produce knitted fabric, and based on the data availability, the energy consumption data for those factories were collected and analysed for the period 2011-2015. The factories have been identified as A, B and C, considering certain ethical concerns. Average annual energy consumption of the factory A, B and C are 158 TJ, 86 TJ and 717 TJ, respectively. Further, energy requirements of factories have increased by 37%, 23% and 54% within the study period. Factories fulfilled this energy requirement using different energy sources: electricity, diesel, heavy fuel oil (HFO), Liquid petroleum gas (LPG), and Biomass (sawdust and wood). However, both factories A and B were able to increase their eco-efficiency of energy use (i.e. mass of the product per energy consumption) by 6% and 57% respectively within the study period by using energy in a more sustainable manner. Factories A, B and C were able to increase their production in 2015 compared to 2011 by 45%, 71% and 31% respectively within the study period but their CO<sub>2</sub> emission decreased by 74%, 40% and 46%. This reduction was mainly influenced by the replacement of HFO by biomass. As a result, eco-efficiency of CO<sub>2</sub> emission of factories (i.e. mass of the product per CO<sub>2</sub> emission) have increased each year with fluctuations within the last five years. Using biomass as the alternative energy source not only caused positive impact on the environment but also on the profit of the factories. Using biomass as the main fuel for the boilers reduced the cost per unit production of the factories A, B and C by 49%, 40% and 3% respectively. Moreover, all three factories buy biomass from the surrounding villages which generate employment opportunities for the villagers. As intensive use of wood logs as biomass may lead to deforestation, all three factories encourage the use of saw dust and sustainably cultivated rubber in generating energy. As biomass positively affects the environment, economy and society, it can be considered as a sustainable energy source for textile industry.

**Keywords:** Biomass, Sustainable energy, Eco-efficiency