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Abstract

There is a growing demand for alternative forms of energy that could firstly replace fossil fuels, with the environmental advantages resulting therefrom, but that could be as well economically more beneficial by allowing companies to obtain competitive advantages from the aforementioned alternative forms of energy. In this sense, the use of waste to produce thermal energy is presented as an alternative worthy of study. In this paper, an analysis is made of the use of waste from the textile industry, more precisely cotton waste, which is used as a renewable resource for the production of thermal energy. After the characterization of the waste, the energetic potential is determined comparatively to other fuels such as woodchips and wood pellets. A comparative economic assessment with other fuels is carried out. The obtained results show that the cotton briquettes have a heating value of 16.80MJ/kg and a cost of 0.006 €/kWh when used as fuel. This predicts an annual reduction in fuel cost of 80, 75 and 70% when compared with fuel-oil, wood pellets and wood chips, respectively. Thus, the use of cotton waste could be a viable alternative, economically and environmentally, to produce thermal energy.

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Keywords: energy waste; textile waste; cotton waste; energy recovery; renewable resource; economic analysis.

1. Introduction

Modern society demands the eager pursuit of new energy sources that can meet the growing demand for energy, both for domestic and industrial use. The industrial sector, which operates in a globalised world where competition arises from different fronts, is investing considerable time and money in the development of energy solutions that might enable a reduction in production costs and thus increase competitiveness. This search stems mainly from the difficulty of reducing operating costs related to labour or raw materials under current market conditions (Smith and Ball, 2012; Bornschlegl et al., 2016; Eustathios Sainidis and Andrew Robson, 2016; Esen et al., 2006, 2007a; Esen and Yuksel, 2013; Esen et al., 2007b).
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