

# **Transforming Polyester Waste of Garments Industry into Energy: A Sustainable Solution for Resource Recovery**

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## **Abstract**

This study looks into a cutting-edge method for converting polyester waste of the garments industry into useful fuel and gas resources, offering a sustainable solution for effective waste management and resource recovery. The research investigates the application of novel thermal and chemical processes to effectively decompose polyester waste generated from different sections of the garments industry and extract energy-rich compounds that can be transformed into usable fuel and gas. Through comprehensive experimentation and analysis, this research demonstrates the viability and environmental benefits of this conversion method, presenting a promising avenue for reducing textile waste and producing alternative energy sources. Converted Gas from Waste Polyester demonstrates a moderate energy content, often ranging from 30 to 40 MJ/m<sup>3</sup>. Converted Fuel from Waste Polyester (Bio-oil) demonstrates an energy content ranging from 35 to 45 MJ/kg based on the specific composition obtained through pyrolysis. If Bangladesh were to implement efficient conversion processes for its waste polyester garments, it might contribute to reducing greenhouse gas emissions by an estimated range of 10,000 to 20,000 tons of CO<sub>2</sub> equivalent annually, considering the volume of polyester waste generated in the country.

## **Keywords**

Polyester; Waste; Fuel; Gas; circular and eco-friendly approach

## **Biographies**

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**Dr. Md. Abdus Shahid** is a Professor in the Department of Textile Engineering, Faculty of Mechanical Engineering at Dhaka University of Engineering and Technology (DUET) Gazipur 707, Bangladesh. He has vast experience in the field of textile research and innovations. His areas of expertise are the fabrication and characterization of functional textiles, recycling of textile wastes, electrospinning, polymeric materials and composites. He so far published more than 60 peer review journals and conference papers. He is a life fellow of the Institution of Engineering Bangladesh (IEB); life member of The Institute of Textile Engineers and Technologists (ITET), Bangladesh; life member of Bangladesh Physical Society (BPS); Member of American Chemical Society (ACS).