

USE OF FABRIC WASTE AS FUEL FOR BIOMASS BOILERS (CAPACITY 1500 KG/HR) WITH SIMPLE CYCLONE SYSTEM AND WITH WET SCRUBBER SYSTEM

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Abstract

Textiles and apparel products design, manufacture and export is one of the largest industries in Sri Lanka and plays a key role in advancing the country's economy. The apparel industry of Sri Lanka employs about 15% of the country's workforce, accounting for about half of the country's total exports, and Sri Lanka is among the top apparel-producing countries in the world relative to its population. Despite their economic importance the sector too contributes to environmental pollution. Apart from other environmental issues; management of fabric waste is a major problem face by the industry. As a solution, some apparel industries use their fabric waste as fuel to operate their biomass boilers and when used it leads to increased emission of air pollutants. This study assess contribution of air pollutions when waste fabric is used as a fuel for boilers.

The selected boiler is a biomass boiler with capacity of 1500 kg / hour. Different proportions of fire wood and fabric waste were used as fuel for boiler and the air emission levels with respect to Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO) and Particulate Matter (PM) were measured together with other relevant parameters. Then portions of firewood to fabric waste were started from 100% firewood and 0% fabric waste and then increase the amount of fabric waste by 20% by substituting to relevant fire wood fraction and finally replacing 100% with fabric waste. The results show increased PM and CO level when the proportion of fabric waste is increased. Up to 20% of fabric waste, the PM levels are within Interim emission standards stipulated by the Central Environmental Authority (CEA) of Sri Lanka; boilers of capacity less than 2 tons/hr, operated by using biomass with simple cyclone system. However, when fabric waste percentage is increased beyond 20%, the PM emission levels exceeds the prescribed emission levels in regulation (150 mg/Nm³). With introduction of a wet scrubber in addition to simple cyclone air pollution control system, 50% fabric waste can be accommodated and PM levels can be maintained within the prescribed limits. But, wet scrubber is not fully effective in controlling CO emissions and therefore may exceed respective prescribed levels in the regulations, however, largely depend on combustion efficiency of the process. Also, addition of

more than 50% waste fabric can result exceedance of maximum permissible PM emission level. Inclusion, it can be stated that 20% of fabric waste can be safely used with firewood for biomass boilers with simple cyclone system, and 50% fabric waste with firewood can be used for biomass boilers with simple cyclone system together with a wet scrubber system while keeping PM levels within prescribed permissible limits.

Key words: Fabric Waste, Scrubber, Boiler Emission