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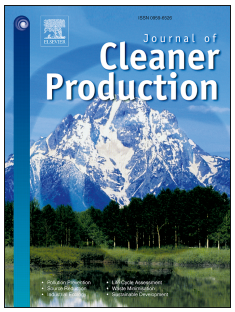

Sustainable textile production: cleaner production assessment/eco-efficiency analysis study in a textile mill

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Sustainable textile production: cleaner production assessment/eco-efficiency analysis study in a textile mill

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Abstract

Cleaner production assessment studies were carried out according to the Integrated Pollution Prevention and Control and Industrial Emission Directive in a cotton/polyester fabric finishing-dyeing textile mill, located in Denizli, Turkey. Following detailed on-site process evaluation, environmental performance of the mill was evaluated. Data of the material flow and the energy consumption in all processes was collected. Mass-energy balances and specific input and output values based on the production processes were calculated. Also, a chemical inventory list was prepared and all material safety data sheets were collected. Environmental performance of the mill was benchmarked against similar textile mills in the literature. 92 Best Available Techniques options were listed. Each suggested BAT option was discussed with the mill management in terms of techno-economic applicability and implementation of 22 Best Available Techniques were decided. In the decision-making process, statistical Multi-criteria Decision-Making Methods (Simple Ranking Method, Weighting Criteria Method, and Weighted Sum Method) were used. Moreover, technical and environmental performances, potential benefits and savings were determined with the implementation of identified 22 Best Available Techniques such as good management practices, water and energy consumption optimization-minimization techniques, chemical consumption optimization and substitution. These evaluations have revealed that after the implementation of suggested 22 Best Available Techniques, following reductions could be achieved if those techniques were implemented in the future: 43-51% water consumption, 11-26% energy consumption, 16-39% chemical consumption, 42-52% wastewater flowrate, 26-48% chemical oxygen demand load, 12-32% waste flue gas emissions, and 8-18% solid waste generation. Payback periods of the suggested Best Available Techniques were estimated as 1-26 months.

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