Cleaner production assessment studies were conducted in a textile mill employing wool and acrylic fiber production and subsequent dyeing. A company-wide mass-balance analysis was performed. Various specific consumptions, emissions and waste generations were determined. The performance of the mill was evaluated based on BREF Documents. Water quality analysis indicated that process wastewaters from wool yarn softening, LP-VP printing machines and acrylic yarn washing could be reused in these processes, even without further treatment. Process wastewaters from wool yarn washing and softening in hank dyeing machines could be directly reused in tank washings and/or blended with process waters for direct reuse in the same or other processes. By the application of suggested BAT including wastewater reuse, machinery modifications, reuse of steam condensate, and good management practices, total water consumption may be reduced 35–65%. Substitution of 12 chemicals with more biodegradable and less toxic ones and installation of automatic chemical dosage systems may decrease COD loads about 25–50%. Furthermore, chemical and dyestuff consumptions could be reduced 31%. Energy consumption could be reduced by BAT suggestions including implementation of energy recovery systems for high temperature wastewater flows and flue gas emissions; process monitoring-control and various machinery optimization. Thus, potential reductions in total energy consumption in the mill may be up to 70%. Waste gas emissions could be reduced 25–65%. Waste generations may be decreased 5–10% with good management practices and reuse of especially textile wastes. Pay-back period of the suggested BAT options was found to be generally up to 4 years.