EFFECTS OF DECREASED RELEASE OF BOD/COD & TSS ON ENERGY USE

Energy Use for Wastewater Treatment

Collection and treatment of process wastewaters typically requires the use of pumping systems to transport wastewater from process areas throughout the mill to the wastewater treatment system and between wastewater treatment system components such as clarifiers, biological treatment tanks, and residuals management systems. Aerobic biological treatment systems, which are used to treat wastewaters at the vast majority of mills worldwide (IPPC 2001), require adequate mixing in the reactor basin and a supply of air or oxygen to support biologically based degradation of organic wastewater constituents. A considerable amount of electrical power is required for pumping, mixing, and supplying the air or oxygen needed to support biological treatment.

Rough estimates of electrical use at wastewater treatment systems, as a percentage of total mill electrical use, can be made by comparing literature values for energy consumption by mill type (Nygaard 1997; Williamson 1999) with energy requirements for wastewater treatment (NCASI 1998). Table B7 summarizes some of these estimates.

Table B7. Relative Amount of Mill Electricity Consumption for Wastewater Treatment Systems

Mill Type	Percent of Total Mill Electricity Usage Consumed in Wastewater Transport and Treatment Systems
Kraft pulping integrated with fine paper	4.8
Mechanical pulping integrated with newsprint	1.3
Deinking integrated with tissue	7.2
Non integrated paper, paperboard, tissue, pulp drying	4 to 7

A reduction in the relative amount of energy consumed during wastewater treatment can be achieved through a reduction in the load to the treatment system. A common technique for reducing the load of BOD and/or TSS sent to wastewater treatment systems is by implementing spent pulping liquor loss control and/or recovery systems. Minimizing and/or recovering liquor losses can reduce discharges to water by both reducing the load on the wastewater treatment system and by reducing the day-to-day variability in untreated wastewater load, leading to more stable treatment system performance (NCASI 2012). The recovery and use of raw material, either in the product or process, or for fuel value, will offset energy associated with acquiring and processing replacement raw materials, and thus would be a co-benefit of source reduction.

Some source reduction methods involve the substitution of one chemical for another. An example is the replacement of chlorine in chemical pulp bleaching with chlorine dioxide. In doing so at kraft pulp mills, untreated wastewater loads of AOX, BOD, COD, and color are reduced (see the Chlorinated Compounds section of this tool for more information). However, the energy required to manufacture chlorine dioxide is much greater than that needed to produce chlorine on an oxidizing power equivalent basis. In this case, the source reduction activity has an environmental trade-off with respect to energy consumption and associated greenhouse gas emissions.

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