Cleaner technology project for pulp & paper sector

http://pisd-pak.org

Programme for Industrial Sustainable Development, Pakistan

Introduction

Cleaner Production Institute (CPI) has initiated the Programme for Industrial Sustainable Development (PISD) on July 01, 2007 with the financial partnership of Embassy of Kingdom of Netherlands (EKN) to help Pakistani industry stay competitive. The programme essentially upholds the need of internalizing environment and energy costs into an economic process. Sector specific cleaner technology and energy efficiency projects are the components of PISD. Pulp & Paper manufacturing is one of the four major industrial sectors, together with leather, textile and sugar, on which the programme will continue to focus over the first three years of its operation.

Pulp and paper sector of Pakistan

Pakistan has over sixty small and large paper and paperboard mills with an annual installed capacity of nearly 400,000 tons. Most of the paper mills are located in the Punjab and the Northwest Frontier Province. Pakistan Pulp, Paper and Board Mills Association (PPPBMA) is collaborating with CPI to facilitate its member industries to overcome major environmental challenges of the pulp and paper sector of the country.

Major environmental and energy concerns

Wastewater

Tons of pulp dilution water, cooling water, cooking liquor waste and spent liquor water circulates in a pulp and paper mill's processes. The high water usage magnifies the cost of raw water and effluent treatment plants, pumps, piping, storage etc. Most of the process water is discharged as effluent, carrying residual process chemicals and dissolved fibers. Mills are generally located in areas where the water table is high and natural drainage is not adequate, making groundwater contamination a major concern.

The most significant stream of wastewater emanates from washing of cooked pulp. Termed as Black Liquor, it contains dissolved organic compounds which increase the Chemical Oxygen Demand (COD) of receiving waters. Besides, bleaching effluents are also highly toxic due to presence of chlorinated compounds. Chlorine and its compounds combine with organic matter which leads to the generation of Absorbable Organic Halogens (AOX). These are hydrophobic, persistent and bio-accumulative, rise up through food chain and eventually lodge in human tissues. These can result in cancer, birth defects, and skin diseases.

Air emissions

The most significant air emission issue of the mill relates to the diffused chlorine emissions. These emissions impact the health of the workers severely. Sulfur dioxide from sodium sulfite manufacturing plant, sulfite pulping process and cooking liquor preparation system, and dust from raw material cleaning systems are also important air emission concerns for the mill. Furthermore, nitrogen oxides and particulates are emitted from steam boilers and generators. Various chemicals used in the process are the source of Volatile Organic Compound (VOC) generation in the chemical stores and in the occupational environment.

Solid waste

Major solid wastes from paper mills include waste fiber, unwanted materials from the raw material cleaning operation, empty containers and bags, degraded and/or rejected wheat straw, fines and dust, ink sludge from recycled fiber operations, used lubricant containers, discarded machine parts etc.

Health risks

Excessive exposure to dust, chlorine compounds and VOCs, high noise levels (reaching up to 100 dB) and hot working environment are major health irritants in pulp & paper mills. Excessive exposure to dust may cause soreness in eyes, asthma, and other respiratory diseases. Toxic gases, chlorine and VOC fumes are released at various stages of the process and are severely hazardous to health. Working in hot environment may also result into heat stroke, fainting and heat rashes among workers. Excessive noise in the occupational areas can cause permanent hearing loss, dull senses and increase accident rates.

Energy issues

Various forms of energy are extensively used in a typical pulp & paper mill. Major energy losses occur in the electrical distribution systems, electric motors, mechanical driving systems, equipment installation, lighting, steam distribution system, exhaust of hot gases, wastage of hot wastewater, steam leakages, etc.

Eco management

Tata Steel approach

http://ecocitizen.tatasteel.com

Eco Citizen, Tata Steel, India

The growing energy needs of the world can only be attained through energy conservation, which in turn needs adoption of new and efficient technology, modernisation of equipment and new ways of operating.

Tata Steel, recognising the importance of environment protection and energy conservation, started modernising its activities and processes since 1983. Adoption and absorption of state-of-the-art energy efficient technologies, fundamental changes in the operating philosophy and installation of pollution control equipment at every stage have minimised environmental burdens. It has resulted in significant mitigation of greenhouse gases in the entire product chain bringing about remarkable and positive changes in pollution control. Tata Steel is among one of the few steel plants in the world, where all manufacturing and service facilities are certified under ISO 14001:2004 (EMS).

Emissions, effluents and waste management

Reducing emissions is a priority for the Company. Operational investments, such as the new H Blast Furnace in Jamshedpur, seek to employ state-of-the-art equipment, which improves efficiency and reduces pollution.

Greenhouse gas (GHG)

Of the six Greenhouse gases, Carbon Dioxide is most relevant for the steel industry. Tata Steel has reduced the CO_2 emission by 35% in the last 12 years.

Following specific measures to address Greenhouse gas emissions, there is a steady downward trend in CO_2 emissions from the Steel Works. In 2007-08, CO_2 emissions were reduced by 4.2% to 2.04 t/tcs, equating to 2 t/tls. CO_2 emissions calculations are based on GHG protocol guidelines.

Water discharges, runoff and the receiving ecosystems

The Company discharges its treated effluent from the works and treated domestic sewage from township to the rivers Subernarekha and Kharkai. Studies carried out by National Environmental Engineering Research Institute (NEERI) in the year 1993-95 and 2000 to assess impact on ecosystems/ habitats of rivers have found no significant impact on the aquatic eco-system. Noamundi and Joda Iron Ore Mines as well as West Bokaro and Jharia Collieries have all achieved zero discharge. The domestic effluent is discharged through the septic tank - soaking pit route at the mines and collieries. Sewage treatment plants have been provided for the entire township at Jamshedpur. 100% effluent water is treated before being discharged upstream.

Effluent handling and waste management

Waste handling

89.6% of solid waste generated from Steel Works is recycled or reused. 17% of the solid waste generated, amounting to approximately 6,12,300 tonnes in 2008-09 was used to fill low-lying areas and for peripheral road construction around Jamshedpur.

Effluent management

Wastewater from the steel making process is being treated with the best available physio-chemical methods and being recycled as well. Wastewater from the coke plant is treated biologically where organic pollutants are oxidised and decomposed by micro-organisms. The Company has reduced the levels of total pollutant discharge in wastewater streams from 0.211 kg/tcs in 1999-2000 to 0.128 kg/tcs in 2008-09.

Solid waste management

Tata Steel generates around 659 kg of various kinds of solid wastes (excluding fly ash) for every one tonne of crude steel produced. About 85% of these wastes are utilised either through recycling and reuse in own processes or sold as input materials to other industries. Remaining wastes are sent for safe land filling.