Waste Minimisation And Utilisation Initiatives

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ABSTRACT

Many environmental problems arise from the deliberate or inadvertent abuse, misuse and over use of natural resources by human beings. In the past, changes were always slow, but this is no longer true. Industrial activities have drastically increased the pace at which changes in the environment are taking place. ITC Ltd., PSPD, Unit: Bhadrachalam, is the largest paperboard manufacturing unit in South Asia. Growth and Development in Harmony with Environment has always been the approach of this Mill. This mill has already implemented the latest Cleaner Technology in pulp bleaching and the first in the country to adopt Elemental Chlorine Free (ECF) and Ozone pulp bleaching. Today, it has also achieved the status of **"Zero Solid Waste Generation"** by adopting the four principles such as, ***Reduce , Reuse , Recycle and Recover***. In any Paper mill, its emissions include, Waste water and Solid wastes of both inorganic and organic in nature. At this mill, the Waste water generation is minimised by effective reycling, treating them beyond the norms and utilising it for crop irrigation. Thus providing irrigation facility throughout the year to near by agricultural fields and at the same time avoiding pollution in the receiving waters. The solid waste such as flyash from steam boilers are totally given to manufacture environment friendly bricks .The fiber waste generated is utilised to manufacture low grade boards and the chipper dust along with wood waste is given to near by mini power plants. The total solid waste is utilised as raw material for the other industries and also generating employment to the rural mass.

1. INTRODUCTION

Waste is any material that is not needed by the owner, producer, or processor. In fact there is no real waste in nature. The apparent waste from one process becomes an input in another. Waste management practices were initially developed for proper disposal or collection of solid wastes to avoid the adverse effects on public health. In dealing with waste, there are two fundamental requirements: generating less waste and an effective system for managing the waste produced. The ultimate aim is to manage all the waste in an environmentally and economically sustainable way. It is a viable option inlieu of traditional method of landfill. Waste management includes value addition to the waste, energy produced from the waste, variable rate charging to consumers, public education and shared responsibility. The participants are producers, consumers and local government. The results include increased recycling and energy recovery (1). There are generally four different techniques for effective waste management (2). They are:

Reduce : Source reduction

Reuse : Multiple use of products

Recycle : Mechanical recycling

Recover : Feedstock & Energy

ITC Ltd.-PSPD
Unit: Bhadarachalam.
Village: Sarapaka-507128
Dist. Khamman (A.P.)

2. INDUSTRY & ENVIRONMENT

Industrial development is an important constituent in our pursuits for economic growth, employment generation and betterment in the quality of life. On the other hand, industrial activities, without proper precautionary measures for environmental protection are known to cause pollution and associated problems. Hence, it is necessary to comply with the regulatory norms for prevention and control of pollution. Alongside, it is also imperative to go beyond compliance through adoption of clean technologies and improvement in management practices.

Commitment and voluntary initiatives of industry for responsible care of the environment will help in building a partnership for pollution control (3).The solid waste generation details and the reduction in specific solid waste at Unit: BCM are shown in Table 1 & 2 . respectively.

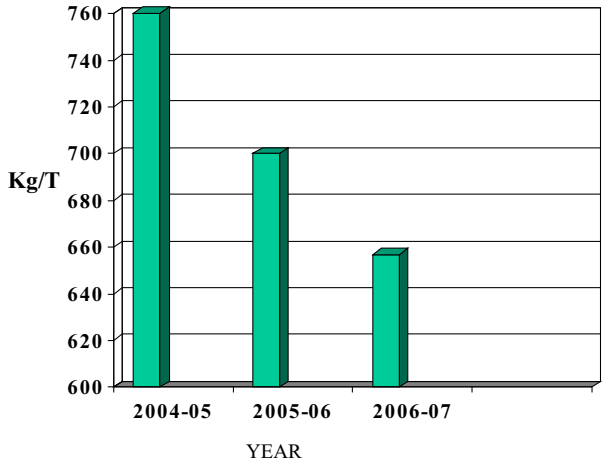
TABLE-1

MAJOR SOLID WASTES

	QTY.
• FLY ASH	600 - 700 TPD
• LIME SLUDGE	70 - 80 TPD
• SFT-PLASTIC WASTE	5 - 6 TPD
• WOOD SLIVERS	10 -20 TPD
• CHIPPER DUST	30 - 40 TPD
• PULP MILL T.REJECTS	15 - 20 TPD

TABLE-2

Specific solid waste generation at BCM Unit



3. INITIATIVES TAKEN BY ITC Ltd. PSPD. Unit Bhadrachalam (IN MINIMISATION OF WASTE)

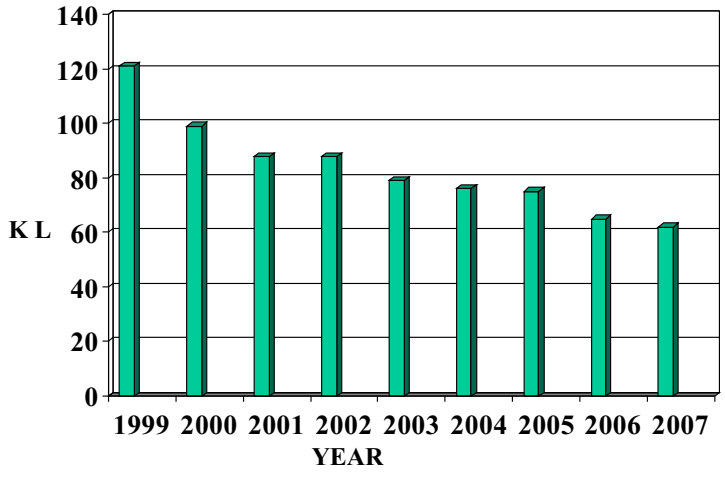
3.1. RECYCLE & REUSE

3.1.1:WATER:

The water source for Bhadrachalam unit is from river Godavari. Daily about 60,000 70,000 Cu.M. of water is drawn. Apart from recycling in the paper machines , over 7,000 Cu. M. of back water is also recycled in the process. The specific consumption of water in pulping and paper production has been drastically reduced beyond the statutory limits . The specific water consumption over the years is shown in Table.3.The water consumpition has been drastically reduced to 62 Cu..M per tonne of product by adopting water recycling methods.As a part of reuse of water, the combined Waste water is discharged after biological treatment. Nearly 80% of waste water is utilised by farmers to raise two good crops annually in an area of 1200-1500 acres of land. The crops grown are paddy, Jawar and cotton. Some of the farmers have switched over to eucalyptus plantations. To study the impact of use of biologically treated waste water on soil and crops, services of Andhra Pradesh Agricultural University are being utilised. The soil characteristics of the land after 20 years under treated waste water irrigation and crop leaf composition are shown in Table 4 & 5 respectively. This proves that, the treated waste waters can be used safely for crop irrigation without any effect to crop and the soil (4).

TABLE-3

SPECIFIC WATER CONSUMPTION AT BCM Unit



3.1.2. FLYASH UTILISATION AT ITC-PSPD, UNIT : *Bhadrachalam.* (CONVERTING FLYASH INTO LOW COST BUILDING MATERIALS)

With improved energy efficiency, today, Bhadrachalam unit meets its 95% of power requirement though Captive/Co-generation of power. As a result of it, on an average, daily about 600-700 tonnes of flyash is generated depending on the coal quality. To find solution to the flyash utilisation and in support of Nation's policy on flyash, ITC-PSPD has taken up the promotion of flyash utilisation for brick making in a big way.

Clay brick is the unchallenged walling material in India on account of its techno-economic logistics. The structure of clay brick industry in India has not changed even in this space age. Where, not less than 90% of the production units are still confined to cottage and small scale sector (5). Based on the above logistics, to produce flyash bricks of better quality than clay bricks, also cheaper and durable, R&D work was done to develop environment friendly flyash bricks. After an year's effort, a suitable composition to utilise the following industrial wastes, flyash, lime sludge and gypsum was found out, which gives a compressive strength of about 80-100 Kg/cm2.Effotrs are made to utilise maximum quantity of flyash in brick making. Today the ash composition in the flyash brick goes as high as of 88%, that too without fire curing as done for clay bricks. Using these flyash bricks, more than 200 houses have been built in the colony and even used for factory building constructions. Encouraged by this, the neighbouring industries like M/S. The Singareni Collieries, M/S.Nava Bharath and M/S. Kothagudem Thermal Power Station have started using these flyash bricks for their day to day construction activities.

TABLE-4

MAJOR NUTRIENT CONTENT IN CROPS

S No	CROP	N%	P%	K%
1	Paddy	0.88	0.12	2.74
2	Paddy	0.84	0.13	2.36
3	Paddy	0.93	0.10	3.17
4	Cotton	0.53	0.18	1.62
5	Jowar	0.31	0.08	2.44

TABLE-5

Soil Composition In Treated Effluent Irrigated Area

Sno	pH	EC ds/m	OC%	Available Nutrients Kg/Hec.			SAR
				N	P	K	
1	7.86	1.22	1.02	289	31.36	938	0.63
2	7.13	0.83	1.68	351	38.08	962	0.52
3	7.78	0.94	0.88	301	22.40	948	0.67
4	7.38	0.90	0.63	189	11.2	453	0.36
5	7.21	1.5	1.41	276	13.44	1052	0.79
Mean	7.47	1.08	1.21	281	23	871	0.79

The Andhra Pradesh Housing Corporation has started utilising these bricks in a big way for the construction of houses for the masses in the Khammam district of Andhra Pradesh. To meet the demand the company has encouraged and helping the entrepreneurs to set up flyash brick making units around the mill.

The efforts put in by the company to utilise flyash for brick making has helped in achieveing 100% flyash utilisation by October2005 and still able to maintain it by providing flyash for the manufacturing of environment friendly flyash bricks . Nearly, fifty flyash brick making industries in the districts of Khammam, Krishna and West Godavari of Andhra Pradesh , are surviving on this flyash. With this achievement, the company is able to meet the requirements of MOEF notification well ahead of time.

To sustain this, Periodically the flyash brick making units are visited, advising them to improve their efficiency and they are also called for a meeting to know their difficulties in obtaining the raw materials etc., and also help them in procuring to make quality bricks. To support these units, periodic meeting are also being organised with the District Housing Board officials to sort out the issues if any.

3.1.3.PLASTIC RECYCLING :

Is the process of recovering scrap or waste plastics and reprocessing the material into useful products, sometimes completely different from their original state.The UN code for various plastics are shown in Table-6. When compared to other materials like glass and metal materials, plastic polymers require greater processing to be recycled. Plastics have a low entropy of mixing, which is due to the high molecular weight of their large polymer chains. A macromolecule interacts with its environment along its entire length, so its enthalpy of mixing is large compared to that of an organic molecule with a similar structure. Heating alone is not enough to dissolve such a large molecule; because of this, plastics must often be of nearly identical composition in order to mix efficiently (6).Plastic Identification Code Type of plastic polymer Properties Common Packaging Applications are;

high density polyethylene (HDPE) used in piping, automotive fuel tanks, bottles, toys,

low density polyethylene (LDPE) used in plastic bags, sealing film, flexible containers;

polyethylene terephthalate (PET) used in bottles, carpets and food packaging;

polypropylene (PP) used in food containers, battery cases, bottle crates, automotive parts and fibres;

polystyrene (PS) used in dairy product containers, tape cassettes, cups and plates;

polyvinyl chloride (PVC) used in window frames, flooring, bottles, packaging film, cableinsulation, credit cards and medical products.

3.1.4. REUSE OF LIME SLUDGE:

To minimise the solid waste disposal problem of lime sludge generated from the Mills, the company has installed two Rotary Lime Kilns to reburn the entire lime sludge to produce high quality lime.The operation of the Kilns enabled the mill to effectively recycle the Solid Waste (Lime Sludge) generated in the Mills and the purged lime sludge is given to near by Cement mill. This action has solved the problem associated with lime sludge disposal besides helping in the preservation of depleting minerals -Lime Stone with its limited use.

TABLE-6

TYPES OF PLASTICS

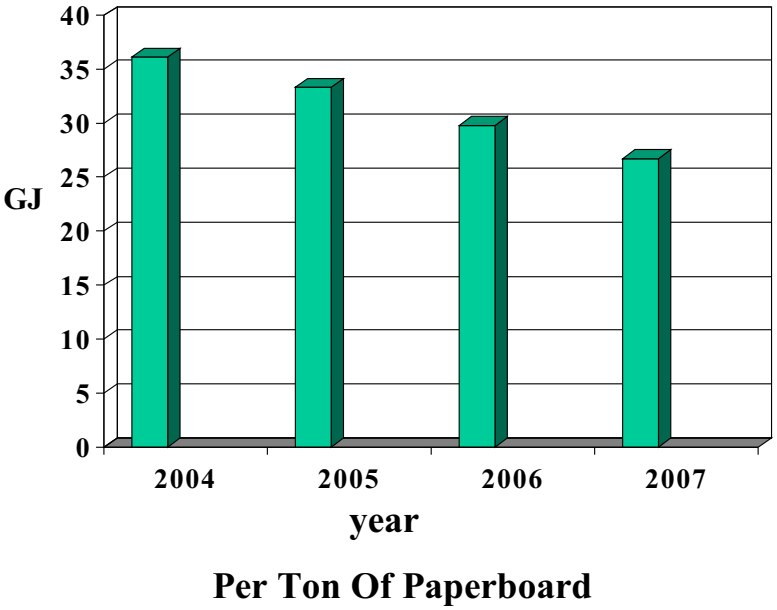
Plastic Identification Code	Type of plastic polymer	Properties	Common Packaging Applications
01 PET	Polyethylene Terephthalate (PET, PETE)	Clarity, strength, toughness, barrier to gas and moisture.	Soft drink, water and salad dressing bottles; peanut butter and jam jars
02 PE-HD	High Density Polyethylene (HDPE)	Stiffness, strength, toughness, resistance to moisture, permeability to gas.	Milk, juice and water bottles; trash and retail bags
03 PVC	Polyvinyl Chloride (PVC)	Versatility, clarity, ease of blending, strength, toughness.	Juice bottles; cling films; PVC piping
04 PE-LD	Low Density Polyethylene (LDPE)	Ease of processing, strength, toughness, flexibility, ease of sealing, barrier to moisture.	Frozen food bags; squeezable bottles, e.g. honey, mustard; cling films; flexible container lids.
05 PP	Polypropylene (PP)	Strength, toughness, resistance to heat, chemicals, grease and oil, versatile, barrier to moisture.	Reusable microwaveable ware; kitchenware; yogurt containers; margarine tubs; microwaveable disposable take-away containers; disposable cups and plates.
06 PS	Polystyrene (PS)	Versatility, clarity, easily formed	Egg cartons; packing peanuts; disposable cups, plates, trays and cutlery; disposable take-away containers;
07 O	Other (often polycarbonate or ABS)	Dependent on polymers or combination or polymers	Beverage bottles, baby milk bottles electronic casing.

3.2 .CONSERVATION OF ENERGY

The pulp and paper industry is intensive in terms of consumption of energy also The energy cost as a percentage of manufacturing cost has increased from 15 % in 1979-80 to about 33% in 2006-07.The energy conservation measures in the pulp and paper industry are the current need i.e. reduction of the net energy per unit of product. Modernisation of old pulp mill and bleaching systems, use of energy-efficient equipment/process and improvement of process and productivity are few major steps taken. The benefits of energy conservation include lower production cost, more competitive edge, an improved ability to withstand future fluctuation in energy cost, an improvement in productivity and environmental benefits.Over the years, the specific energy consumption has been drastically reduced to 26.7 GJ per tonne of production over the at Bhadrachalam unit and which is the lowest in the Indian paper mills. Table-7. shows the reduction of energy over the years.

TABLE-7

Specific Energy Consumption At ITC Ltd.,PSPD. Unit:BCM



Per Ton Of Paperboard

3.3. RECOVER (Energy from Bio mass)

Biomass is a renewable energy resource derived from the carbonaceous waste . It is derived from numerous sources, including the by-products from the timber industry, agricultural crops, raw material from the forest, major parts of household waste and wood. Biomass does not add carbon dioxide to the atmosphere as it

absorbs the same amount of carbon in growing as it releases when consumed as a fuel. Its advantage is that it can be used to generate electricity with the same equipment or power plants that are now burning fossil fuels. Biomass is an important source of energy and the most important fuel worldwide after coal, oil and natural gas. At present, all the waste bio mass generated at Bhadrachalam unit is being given to near by Power plants as a fuel. The mill is also setting up a boiler (Green Boiler), to utlise this waste bio mass for energy generation..

CONCLUSION

Waste Minimisation at source has come up as a sensible approach for sustainable industrial development. The concept of Waste Minimisation is a new and creative way of thinking about products and processes that make them. It is achieved by the continuous application of strategies to minimise the generation of waste and utilisation of it as an input to other processes, reduces the resource consumption and the pollution control cost.

ACKNOWLEDGMENT

The author presents his sincere thanks to the management of ITC. Ltd., PSPD Unit: Bhadrachalam, for providing the information and permitting to present this paper at **IPPTA , AGM , New Delhi** March 2009.

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