Conservation Through Waste

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The Pulp & Paper Industry is one of the highly energy intensive chemical industries and energy cost component is dictating the cost of the production of Pulp & Paper. The need for energy conservation was felt seriously by the paper industry in the early 80's and thereafter the Pulp & Paper mills worldwide started taking up appropriate measures to cut down their energy usuage. Seriuos efforts have been made by Indian Pulp & Paper mills to bring down energy consumption, but still our energy cost is about 50% higher than the mills in developed countries. Serious efforts for energy conservation in Indian mills have been initiated only one decade ago and during this period various integrated approaches have been taken up to cut down the energy cost component. In this article efforts made by Cachar Paper Mill, a unit of Hindustan Paper Corporation Limited, in different areas are highlighted.

INTRODUCTION

Pulp & Paper Industry in India utilizes variety of raw materials, different processes, layouts, diversified technology. The range of products is also very wide. The Pulp & paper manufacturing is highly energy intensive and one ton of paper production requires 6.8 to 8.5 million-kilo calories of energy. 80 % of the total energy is in the form of steam and remaining in the form of electrical energy. This is in the range of 11 to 14.5 million-kilo calories if considered as raw fuel considering the steam generating unit / Boiler efficiency in the tune of 80 + 5 % & 28 ± 3 % for generation of power.

Apart from the fibre, steam and power paper industry also utilizes huge quantity of water and compressed air. Therefore for an industry to reduce its energy cost, an integrated approach should be adopted to cut down its steam. Power, water and air consumption prudently. At Cachar Paper Mill, various efforts has been made since last one decade to bring down the consumption level of these utilities and in this paper various measures taken to conserve valuable resources are highlighted. The study has shown that by reducing wastage of energy, up to 40% energy saving can be achieved.

Cachar Paper Mill, Hindustan Paper Corporation Limited, Panchgram, Hailakandi, Assam

REDUCTION OF WATER CONSUMPTION

In earlier days water was being used as a free input in India but now a days the old concept has been replaced with modified concept of water being considered as the cheapest input. On the other hand, at a time when we are thinking to reduce water consumption, developed countries are thinking for zero effluent discharge. This is mainly because of limited resource of usable water and legislation in these countiries.

Therefore, in order to achieve zero effluent discharge, we will have to take up strict water conservation measures and adopt all water reuse, recycle concepts within mills.

Water conservation

Some of the main uses of water in paper industries are transportation of paper making fibres from raw material to stock, dilution and mixing, washing screening and cleaning, and fiber to fiber bonding. In today's high competitive market with continuing emphasis on more stringent effluent limits of both quantity and quality, it becomes much and more important that water uses should be closely monitored. Every m3 of reduction in water consumption would help the industry in several ways.

This would reduce

1. Raw Water pumping cost.
2. Chemical treatment cost of water.
3. Mill water / process water pumping cost.
4. Fiber loss cost. (Because every drop of water leaving the process with some dissolved or dispersed solids will result in losses from the process.)
5. Cost of chemical or heat added during the process.
6. Effluent treatment cost.
7. Effluent disposal cost.
8. Reduces the water cess.
9. And finally reduces the pollution load on environment.

At Cachar Paper Mill, various initiatives for water conservation are taken up and our approach for Water conservation is given below:

1. Recycling of the water.
2. Fine tunings of the processes.
3. Improving the processes efficiency.

Few examples of our efforts for achieving the same are:

1. Installation of cooling tower at paper machine to re-circulate vacuum sealing water to save 195 m3 per hour.
2. Re-circulation of washed water partially in chip washing unit: saving of water achieved = 20 m3 per hour.
3. Extraction no: 2 re-pulper dilutions ClO2 re-pulper dilution chlorine filtrate instead of warm water.
4. Recycle of chlorine filtrate for chlorine washer spray, saving achieved 20 m3 per hour.
5. Using Evaporator combined condensate for preparation of 5% caustic and MDT hood washing saving achieved 14.5 m3 per hour.
6. Circulation of all equipment cooling water & A.C. outlet water to powerhouse cooling tower saving achieved 40 m3 per hour.
7. Changing the cooling water circuit in identical equipment of lesser rpm (up to 1500 rpm) in series instead of parallel.
8. Dropping the mill water pressure at discharge end.

Result of above:

The water consumption at Cachar Paper Mill, Panchgram situated at Varak Valley of Assam had been reduced from 219 m3 PMT of Paper to 106 m3 PMT of Paper. The year wise consumption is as follows:

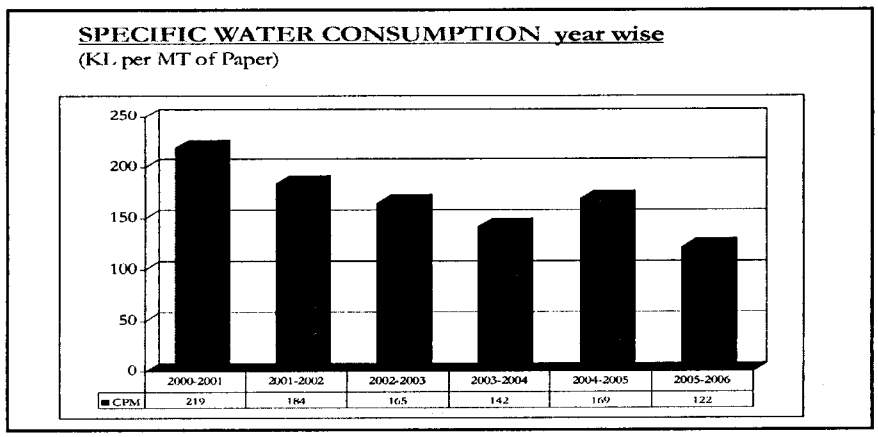
The year and month wise reduction in specific water consumption is shown in Fig. 1 & 2 respectively.

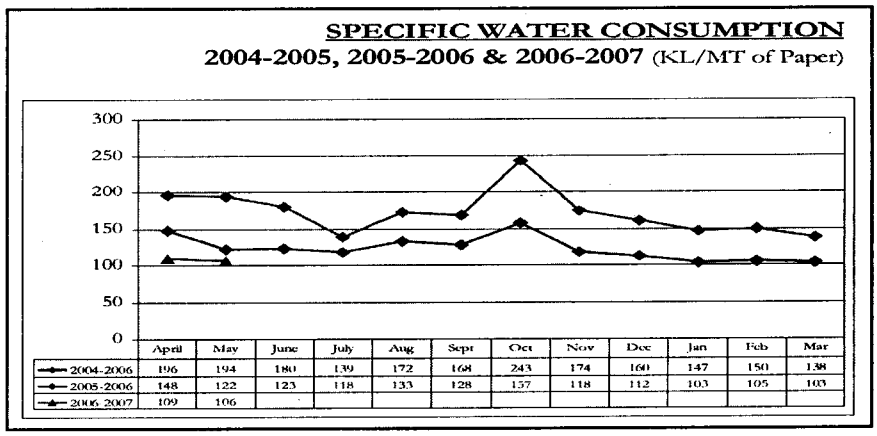
Specific water consumption, m^3 PMT of Paper during last five year

Year	Specific water consumption, m^3 / ton of paper
2000-01	219
2001-02	184
2002-03	165
2003-04	142
2004-05	169
2005-06	122

Specific water consumption, m^3 PMT of Paper for April & May'2006 is shown below

2005-06	m^3 / ton of paper
April'06	109
May'06	106





This achievement could be made with close follow up & day-to-day monitoring of section wise water consumption. Section wise internal target fixed for the year 2005-06 are analysed / monitored on day to

There is an increase in specific water consumption in year 2004-05 due to adding the plant drinking water, DM Plant make up & fire water consumption to the Paper account.

basis and are shown below.

Specific water consumption, m^3 PMT of Paper

Department

	Target for 05-06	Achieved for 05-06
Paper machine	24	32
Pulp Mill	45	48
Rec & Evap	2.8	3
causticizing	3.6	3
Utilities	16.2	16
ETP	1	1
Chipper	8.1	8
Fire water	1.8	2
D M Plant makeup	6.5	7
Plant Drinking	1	1.4
Total for Paper	**110**	**121.4**

Specific Process steam Consumption ton / ton of Paper during last five year is shown below.

Year	Specific steam consumption, ton / ton of paper
2000-01	12.0
2001-02	11.52
2002-03	11.11
2003-04	10.8
2004-05	10.57
2005-06	10.08

Sp. process steam Consumption ton / ton of Paper for April & May'2006

2005-06	ton / ton of paper
April'06	9.27
May'06	9.15

Savings in Steam consumption:

In the same line of our efforts, we could reduce our steam consumption against our process requirement. Few examples in this line are as follows:

1. Replacement of steam ejector in Evaporator with vacuum pump to reduce M. P. Steam consumption in Evaporator.
2. PV duct renovation
3. Installation of LP steam primary heater.

The year and month wise reduction in specific water consumption is shown in Fig. 3 & 4 respectively.

Section wise internal target fixed for the year 2005-06 are analysed / monitored on day to basis and are shown below.

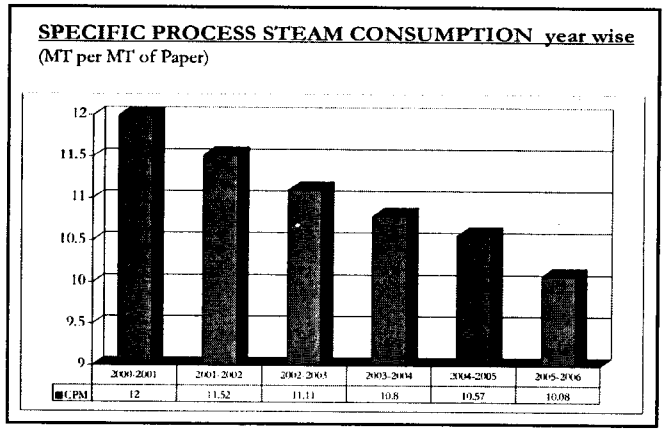
Sp. process steam Consumption ton / ton of Paper for the year 2005-06:

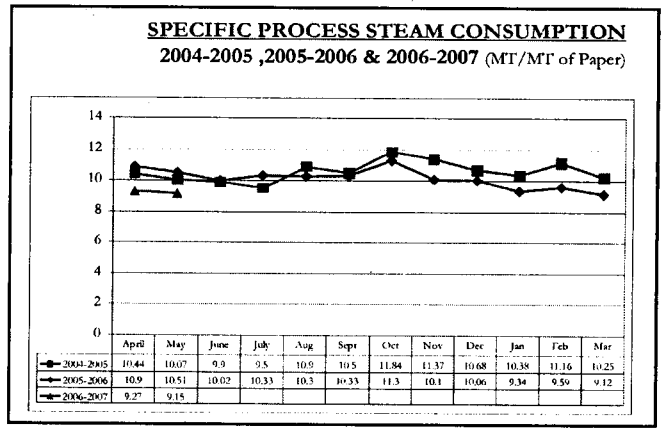
Department	Target for 05-06	Achieved for 05-06
Paper machine	2.20	2.29
Pulp Mill	1.65	1.97
Rec, Evap & Causticising	**3.65**	**3.66**
Utilities	2.0	2.16
Total for Paper	9.50	10.08

Savings in Power consumption:

For the power also we have carried out various energy saving exercises and implemented our findings. Some of the examples are as follows:

1. Installation of capacitor bank for the improvement of power factor.
2. Installation of V.F.D. where there was fluctuation of load & running the motors from 30%





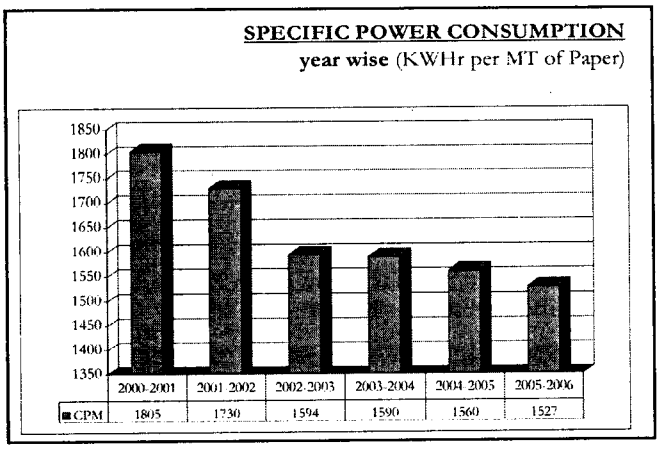
load to 80% of its load.

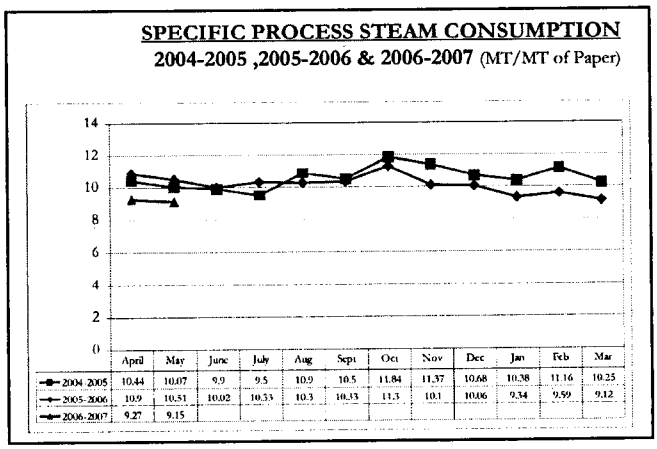
3. Right sizing of motors in case of over size motors with proper identification in the mill.
4. Trimming of pump impellor as applicable in the mill.
5. Conversion of Mercury vapor lamp to metal halite lamps in the mill & colony.

The year and month wise reduction in specific power consumption is shown in Fig. 5 & 6 respectively.

Sp. Power Consumption kWh / ton of Paper for the year 2005-06:

Department	Target for 05-06	Achieved for 05-06
Paper Machine	680	711
Pulp Mill	200	210
Chipper	40	38
Utilities	510	527
ETP & Lagoon	37	25
Hypo Chlorides	8	9
Lime mud & st. light	5	7
Total for Paper	1480	1527





Specific Power Consumption kWh / ton of Paper during last five year is shown below :

Year	Specific Power consumption, kWh / ton of paper
2000-01	1805
2001-02	1730
2002-03	1594
2003-04	1590
2004-05	1560
2005-06	1527

Specific Power Consumption kWh / ton of Paper for April & May'2006

2005-06	kWh / ton of paper
April'06	1524
May'06	1491

Section wise internal target fixed for the year 2005-06 are analysed / monitored on day to basis and are shown below.

It is true that it is very difficult to achieve the best, but it is very easy to achieve better which can be achieved easily if we concentrate on "Why and Why not's".

CONCLUSIONS

The energy conservation efforts made at Cachar Paper Mill over the years has shown potential of energy saving in water pumping cost, chemical treatment cost, fibre cost, cost of chemicals, effluent treatment cost, fibre loss cost and finally the reduction in pollution load from the mill by following systematic water conservation approaches in the mill.

Similarly significant savings have been achieved in steam and power consumption in the pulp & paper manufacturing processes. There is a saving of 44.29% in water, 16% in steam and 15.4% in power over the last 5 years (2001-02 to 2005-06).