SHORT TERM AND LONG TERM ENERGY CONSERVATION MEASURES FOR A SMALL PULP AND PAPER MILLS

V. Suntharalingam M. Pushpaharan (Project Manager) (Mechanical Maint, Engineer) National Paper Corporation SRILANKA

The National Paper Corporation in Srilanka has two Pulp and Paper Mills, at Valaichchenai and Embillpitya. The Valaichchenai Mill in the Eastern Cost was commissioned in 1956 to produce cultural grades of Paper using Paddy Straw as the Raw Material. In 1972 a Board Machine was installed to produce Industrial Grades of Paper and Boards using waste Paper in the furnish alongwith Paddy straw and imported Pulp.

The Embillipitya Mill in the South of Srilanka was commissioned in 1978 to produce Printing and Writing Grades of Paper. The pulping process in both the Mills is a chemical process obtaining a yield of 33%. However, Valaichchenai mill has a high yield steam with 45% yield.

1. CAPACITY OF THE MILLS

Valaichchenai Mills - has two machines

1)	Paper Machine	:	10,500	T/Annum
ii)	Board Machine		12,000	T/Annum
			,	

Embillipitiya Mills -

i) Paper Machine : 15,000 T/Annum Total production: 37,500 T/Annum

2. ENERGY

i) <u>Electrical Power</u>:

The requirement of electric power for both mill is obtained from the National Grid. The over-all specific consumption of electrical power is in the Region of 1100 KWH per Tonne of machine production at the Valaichchenai Mills and 1800 KWH at the Embillipitiya Mills. The Low Specific Energy consumption at Valaichchenai mill is attributed to Recycling waste paper.

3. HEAT ENERGY - STEAM

The requirement of steam for the Pulping and Paper Making Process is generated by Oil Fired Boilers. The specific consumption of steam is in the region of 4.7 metric tonnes per tonnes of Machine Production at Valaichchenai Mills and 8.5 Metric tonnes in Embillipitiya Mills.

COST OF ENERGY:

1) <u>Electrical</u>: The average purchase cost of electrical power from the National Grid is S.L. Rs. 1/55 per KWH and the cost component of electrical power required per metric tonne of paper is 10% at Valaichchenai and 12% at Embillipitiya.

2) <u>Heat Energy</u>: The average cost of generation of 1 metric tonne of steam is in the region of S.L. Rs. 400/- and the cost component of steam required per metric tonne of paper is 11% at Valaichchenai mill and 16% at Embillipitiya Mill.

ENERGY CONSERVATION:

The National Paper Corporation carried out a planned programme for Energy Conservation from 1978. This consisted of short term and long term measures.

(A) SHORT TERM MEASURES CONSISTED OF THE FOLLOWING

- Introducing an efficient cascade system of Paper drying, replacing the old simple heating system installed in 1952, thereby saving 15% of the oil consumed by the Boilers.
- Thermal insulation of the seven digesters as these digresters were installed in 1952 without insulation at a tune when fuel oil was cheap.

3) Good House Keeping:

By good house keeping, steam leaks were attended, exposed steam pipes were insulated, condensate leaks were attended to return the maximum condensate back to the boilers.

259

Float type steam traps were replaced by reliable thermodynamic type of steam traps.

- 4) Incandescent lamps have been replaced with Flowoscent lamps and HPMV lamps.
- 5) Transluscent Roofing sheets have been provided to avoid the use of electric lamps during the Day-time.
- 6) Bio-gas plants using decayed straw have been constructed to provide the requirements of Gas to the laboratories, Canteen and Guest House.
- 7) Power Factor correction equipment has been installed to improve the power factor.
- 8) The rotary waved and Leonard speed control drive for paper machine is being replaced with the Thyristor static convertor, system, by which there is 10% reduction in Power consumption.
- 9) Use of Higher Viscosity of 10000-1500 red-wood seconds.
 (Table I gives the savings/annum so far achieved).
- B) LONG TERM MEASURES:

Feasibility studies on long term measures have been carried out these proposals in stages as they involve heavily capital investments.

 Installation of multi-fuel fired High Pressure steam Boilers for both mills to operate mainly on fuel wood. The fuel wood plantation will be established and managed by the National Paper Corporation.

- ii) Provision of a co-generation plant for both the mills consisting of a double extraction and condensing turbine to supply the steam for the pulp and paper machine with a Generator to supply the electric power.
- iii) Provision of variable speed drives for pumps and fans. The existing squirrel caged motors will be provided with electronic frequency controllers to vary the speed, steplessly. The estimated power saving on each unit is in the region of 40%.
- iv) Thermal Insulation of drying cylinder Erds, Table-2 will give the estimated saving.

TABLE -I

ANNUAL SAVINGS BY SHORT TERM MEASURES

	MILLS EMBILLIPITIYA	SAVINGS PER ANNUM	IN SL.RS.
I)	Improved house keeping	3,500,000	
2)	Replacing Incandescent Lamps with Fluroscenet Lamps	260,000	
3)	Provision of Transluscent Roofing Sheets	156,000	
4)	Bio-Gas Plant	29,000	
5)	Power Factor correction	480,000	e e
6)	Use of Higher viscosity Fuel	1680,000	
		6105,000	1997 - A. A.

	VALAICHCHENAI MILLS	SAVINGS PER ANNUM M.S.L.RS.
1)	Cascade dryi ng sys tem for paper Machine	5,500,000
2)	Thermal Insulation of Digestors	957,000
3)	Improved House Keeping	3,400,000
4)	Replacing Incandescent lamps with Fluroscent Lamps - HPMV Lamps	300,000
5)	Provision of Transluscent roofing sheets	162,000
6)	Bio Gas Plants	15,000
7)	Power Factor Improvement	396,000
8)	Thyristor drive for paper machine	300,000
9)	Use of Higher Viscosity Furnace 011	1,500,000
	G.TOTAL	18,635,000

TABLE - 2

1

ANNUAL SAVINGS BY LONG TERM MEASURES

	EMBILLIPITIYA MILL	ANNUAL SAVINGS IN S.L.RS.
1)	Multi-fuel fired Boiler	13,000,000
2)	Co-generation plant	2,900,000
3)	Electronic variable speed drive	3,350,000
4)	Thermal insulation of Dryer	1,500,000
	Chinder Birde	20,750,000

262

	VALAICHCHENAI MILL	ANNUAL SAVINGS IN S.L. RS.
•		
1)	Multi Fuel Boiler	19,000,000
2)	Co-generation plant	2,800,000
3)	Electronic variable speed drive for pumps & fans	2,790,000
4)	Thermal insullation of Dryer cylinder Eride	1,200,000
		25,790,000
	ሮ መርመል ፤	46 540 000

P