

Energy Management And Energy Conservation at APPM

Khare S.K., Venkata Rao C.S. and Prasad Siva Ch.

ENERGY CONSERVATION OUR CONCERN & COMMITMENT:

Energy is a vital force without which, life as we know it, will cease to exist. Unfortunately, natural Energy resources available to us are finite, with no way of replenishing the quantum we have consumed.

The world is going through a major economic crisis and the price and availability of energy has a lot to do with. None of us can afford to waste energy or use it less effectively.

The Indian Pulp and Paper Industry is the sixth largest consumer of energy in the Indian Industrial sector. Energy cost as a percentage of the manufacturing cost is well above 20%. It is a considerable element cost of production.

Energy saving is the easiest, fastest and most effective method of increasing the profits of a company. It is possible to save energy no matter whether the plant is new or old, large or small with indigenous or imported; as is or under expansion. The benefits of energy conservation include lower production costs, more competitive edge, improved ability to withstand future fluctuations in energy costs, improvement in productivity, environmental benefits etc.

Hence this concern drives us for commitment to improve our energy performance levels continuously.

ENERGY PERFORMANCE OF APPM AT A BALANCE:

Efficient energy management and energy conservation schemes implemented resulted in the improved energy performance.

The salient features the successful energy

performance of the mill for the previous three years (1993-94, 1994-95, 1995-96) are given here under:

Specific consumption of utilities:

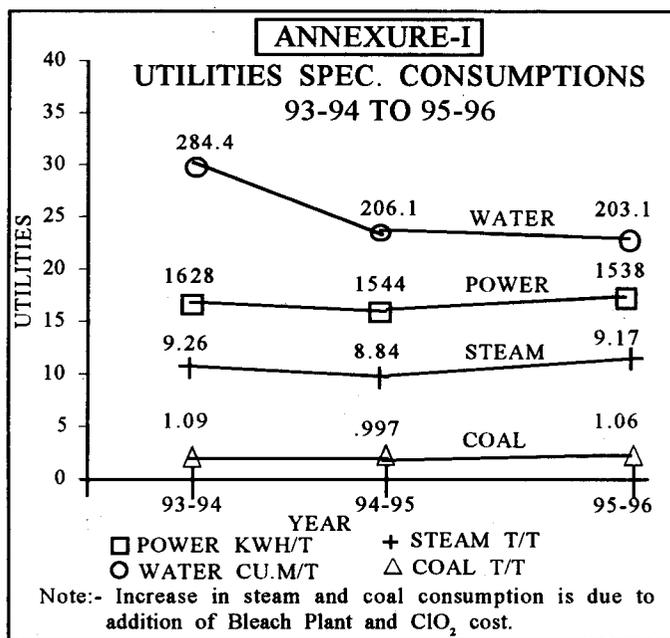
The specific consumption of utilities is reduced considerably in 1995-96 compared to the year 1993-94. The specific consumption of water was reduced from 284.38 Cu.M./T to 203.1 Cu.M./T. The specific consumption of power has come down from 1628 Kwh/T to 1538 Kwh/T. The specific steam consumption was reduced from 9.26 T/T to 9.17 T/T. The specific coal consumption was reduced from 1.09 to 1.06 T/T.

The specific thermal energy consumed has reduced from 4.66 M.K. Cal/T in 1993-94 to 4.35 M.K. Cal/T in 1995-96. The specific electrical energy consumed has reduced from 1.40 M.K. Cal/T in 1993-94 to 1.32 M.K. Cal/T in 1995-96. The total specific (electrical and thermal) energy has reduced from 6.06 M.K. Cal/T in 1993-94 to 5.67 M.K. Cal/T in 1995-96.

This result is achieved in spite of the additional installations like new chlorine dioxide, New Recovery Boiler and new 150 TPD (C-E-D-E-D) Bleach plants. These Plants are installed as value additions for the quality and efficiency improvements without any contribution of additional production. The mill has also taken modernization of paper machine # 3 with marginal increase in production and for better quality and energy efficiency. The details of same are indicated in the Annexure-I.

Specific energy cost for purchased power and fuel:

The specific energy cost for purchased power and fuel was reduced from Rs. 3201/T in 1993-94 to Rs. 3141/T in 1995-96. The reduction could be achieved even though there is substantial increase



of 23% in cost of grid power and 13% in cost of coal. The details of the same are indicated in Annexures-II.

Projected saving in energy cost based on 1995-96 unit costs:

The actual saving in cost could be envisaged if the similar cost of 1995-96 is projected for the earlier years. These projections are given in Annexure-III.

From this it could be seen that the mill has energy cost savings to an extent of Rs. 598 per ton of paper produced with reference to 1993-94, for 83251 Tonnes. It works out to a savings of Rs. 4.97 crores, which is substantial.

ANNEXURE-II
DETAILS OF PURCHASED ENERGY COST
(1993-94 TO 1995-96)

FUELS	UNIT	1993-94	1994-95	1995-96
GRID POWER	KWH LACS	488.856	296.61	232.33
COST OF UNIT	RS./KWH	2.15	2.35	2.64
GRID COST	RS. LACS	1051.04	697.03	613.35
COAL USED	TONS	143546	158789	171870
COST OF UNIT	RS/TON.	1008	1123	1138
COAL COST	RS. LACS	1446.94	1783.20	1955.88
HSD USED	KL	239.92	604.07	187.95
COST OF UNIT	RS/KL	7250	7146	7073
HSD COST	RS. LACS	17.39	43.17	13.29
LSHS USED	KL	509.90	720.89	545.34
COST OF UNIT	RS/KL	5590	5504	6081
LSHS COST	RS. LACS	28.50	39.68	33.16
TOTAL COST	RS. LACS	2543.88	2563.08	2615.69
PAPER PRODN.	TONS	79465	83313	83251
ENERGY COST/T	RS./TON.	3201.26	30.76.44	3141.93

AS PRESENTED IN COMPANY'S BALANCE SHEET

* INCREASE IN ENERGY COST IS DUE TO ADDITION OF THE CHLORINE DIOXIDE PLANT AND EXPANSION OF BLEACH PLANT (CEDED).

THE ENERGY COST FOR 1995-96, PER TON OF PAPER AFTER DEDUCTING THE COST OF ENERGY FOR THESE PLANTS WORKSOUT TO RS. 3054.

IT COULD BE SEEN THAT THERE IS AN INCREASE OF POWER RATES FOR ELECTRICITY FROM RS. 2.15 PER UNIT TO RS. 2.64 PER UNIT AND AN INCREASE IN THE COST OF COAL FROM RS. 1008 PER TON TO RS. 1138 PER TON THIS SUBSTANTIAL INCREASE OF 23% IN GRID POWER COST AND 13% FOR THE COAL.

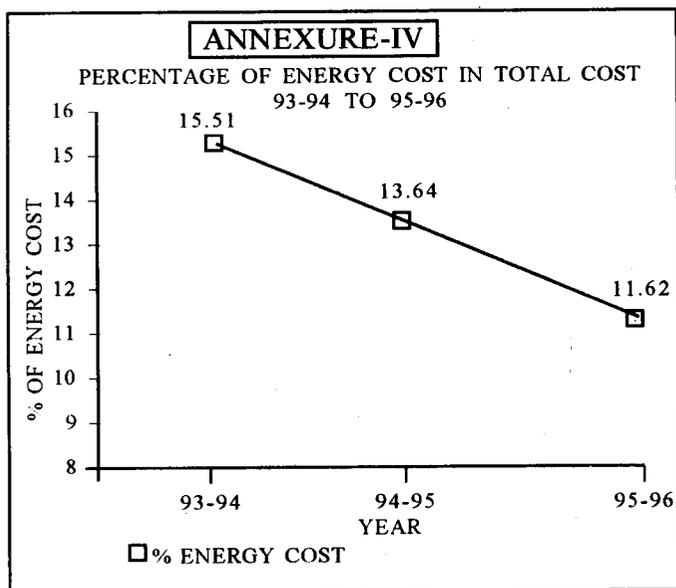
ANNEXURE-III
PROJECTED SAVINGS IN ENERGY COST
BASED ON 1995-96 UNIT COSTS

THE ACTUAL SAVINGS IN THE COST COULD BE ENVISAGED IF THE SIMILAR COST OF 1995-96 IS PROJECTED FOR EARLIER YEARS.

THESE PROJECTIONS ARE GIVEN BELOW:

FUELS	UNIT	1993-94	1994-95	1995-96
GRID POWER	KWH LACS	488.856	296.61	232.33
COST OF UNIT	RS./KWH	2.64	2.64	2.64
GRID COST	RS. LACS	1290.58	783.05	613.35
COAL USED	TONS	143546	158789	171870
COST OF UNIT	RS/TON.	1138	1138	1138
COAL COST	RS. LACS	1633.55	1807.02	1955.88
HSD USED	KL	239.92	604.07	187.95
COST OF UNIT	RS/KL	7073	7073	7073
HSD COST	RS. LACS	16.97	42.73	13.29
LSHS USED	KL	509.90	720.89	545.34
COST OF UNIT	RS/KL	6081	6081	6081
LSHS COST	RS. LACS	31.01	43.84	33.16
TOTAL COST	RS. LACS	2972.11	2676.63	2615.69
PAPER PRODN.	TONS	79465	83313	83251
ENERGY COST/T	RS./TON.	3740.15	3212.74	3141.93

FROM THIS IT COULD BE SEEN THAT THE MILL HAS ENERGY COST SAVINGS TO AN EXTENT OF RS. 598 PER TON OF PAPER PRODUCED WITH REFERENCE TO 1993-94, AND FOR THE PRODUCTION MADE IN 1995-96, I.E. 83251 TONNES. THE SAVINGS WORKSOUT TO RS. 4.97 CRORES. WHICH IS SUBSTANTIAL.



Percentage energy cost:

The percentage energy cost for expenditure towards the fuel and power to total expenditure for the production cost has come down from 15.51% in 1993-94 to 11.62% in 1995-96 inspite of the increase in the cost of the grid power and coal. The details of the same are indicated in the Annexure-IV.

HOW DID WE ACHIEVE IT?

We achieved this performance by

- (a) Top management commitment
- (b) Energy Management System
- (c) Implementing various energy efficient, modernisation and energy saving projects.

The details of which are enumerated as given below:

Top Management Commitment:

Our top management is committed to the following objectives:

- To reduce energy cost.
- To eliminate avoidable losses.
- Install more Energy efficient equipments..
- To consider new Energy efficient technologies.

- To consider the Energy as the most important ingredient on both Industrial and National prospective.

- To ensure success for energy conservation programmes

M/s. APPM has taken initiative and conducted National Seminar on Energy Conservation and cost reduction activities for pulp & paper Industries on 4th and 5th May, 1995 for sharing of experiences of various industries.

Energy Management at APPM:

- In APP Mills a separate and independent Energy conservation department is constituted with qualified and experienced team of engineers.

- We have engaged M/s. MK Raju consultants, Madras, for conducting detailed Energy Audit and Energy improvement studies for arriving at feasible Energy saving proposals. Identified Energy performance improvement projects are implemented.

- APPM has invested money to install necessary measuring instruments for recording the consumption of power, steam and water in various departments and sections.

- The data is collected and daily computerized energy performance monitoring system is introduced with total and specific energy consumption figures for various sections of the mill for all energy inputs lie power, water, steam and fuels, compressed air and condensate returns.

The report indicates figures of today, till date and best achieved norms for immediate comparison and identification of variances. Specific discussions on the energy performance based on this report are held in daily production meeting for taking effective corrective actions. A copy of the daily performance report is enclosed herewith (Annexure-V).

- Detailed monthly Energy performance reports prepared for review in the monthly mill

THE ANDHRA PRADESH PAPER MILLS LTD
RAJAHMUNDRY
ENERGY CONSERVATION DEPARTMENT

ENERGY PERFORMANCE DAILY REPORT FOR 10 TH OCTOBER 1995.

POWER :

a) TOTAL GENERATION & SPECIFIC CONSUMPTION

	GRID	10 MW	STAL	EAWSE	D.G.SETS	TOTAL	M/C		KWH/T		TOTAL	KWH/T		POWER CONSUMPTION			
							PROD	BL.5%	M/C	FIN		EXCLUDE	(M/C)	(FIN)	BP 3	OLD 2	
							FIN (LOSS)				T.G.AJK						
DAY	7000	24600	9600	—	0	41300	297.9	272.6	1385.1	1511.6	13500	398520	1337.8	1462.0	0	11800	1440
TILL DATE	657000	2394000	964800	0	0	4015800	2538	2322.1	1582.4	1729.4	126730	3880070	1538.9	1670.9	0	131560	34850
AVERAGE	65700	239400	96480	0	0	401580	254	232	1582	1729	12673	388007	1538.9	1670.9			
T ACHIEVED	81257	216194	87756	0	5650	390857	256.5	234.9	1523.8	1663.9	12424	378033	1475.4	1611.0			

(b) SECTIONWISE SPECIFIC POWER CONSUMPTION

COST CENTRE	UNITS	AGRA	AGRAJA	ANUJA	ABJA	ALPAMA	AMPH	OMPH	EPH	VEDIPLAN	P.MILL	PAPER	SEDA	10MW	ALX	STAL	ALX	WFO	ESSEN	COAT				
		T	T	T	T	T	MEG	MEG	MEG	CHPS	T	PULP	T	STEM	T	REC.	T	COND.	T	COND.	T	T	T	INS
DAY	Consumption	18660	39800	41800	12700	76550	4000	18700	13400	4300	63800	43720	41500	8400	5100			820	4350	700				
	Production	26.5	70.0	66.2	9.2	126.0	12.0	11.7	10.5	852	264	2199	1032	977	450			278	278					
	Spec.consum	704.2	568.6	631.4	1390.4	607.5	334.7	1620.9	1276.9	5.2	242.0	19.9	39.4	14.1	11.3			2.75	15.27					
TILL DATE	Consumption	182650	377270	406650	121270	706230	41560	192490	120820	39000	590490	430820	414320	84040	51370			8450	49660	10120				
	Production	233.8	652.7	536.2	96.6	1018.5	114.8	111.3	100.2	7061	2438.8	20988	10568	5339	4610			2538	2538					
	Spec.consum	785.5	578.0	738.4	1255.4	693.4	362.2	1739.8	1208.8	5.5	245.1	20.5	39.2	15.2	11.1			3.33	19.57					
AVERAGE	Consumption	17738	35012	40988	14089	74766	5029	17450	10482	4167	63407	81655		7850	4575			802	4350					
PERCENT OF	Production	21	63	60	9	104	11.41	11.16	10.08	700	233	2548		467	462			260	260					
1994-95	Spec.consum	844.7	555.7	683.1	1667.4	718.9	440.8	1563.6	1045.0	6.0	272.1	27.7		16.8	9.9			3.08	17.50					

STEAM:

a) TOTAL GENERATION & SPECIFIC CONSUMPTION

COST CENTRE	C.F.1	C.F.2	C.F.3	C.F.4	I.J.T	RB 1	RB 2	RB 3	TOTAL	CONDEN-PROCESS		PROCESS		CONDEN-CONDEN-			
										SALE	STEAM	STEAM/T	STEAM/T	SALE/T	SALE/T		
										M/C		(FIN)		(M/C)		(FIN)	
TPMY	356	0	547	540	756	0	638	444	3251	1047	2204	7.40	8.09	3.51	3.84		
T. ATE	3624	0	5342	4646	7376	0	6399	4259	31556	10149	21407	8.44	9.22	4.00	4.37		
AVERAGE	362	0	534	465	738	0	631	426	3156	1015	2141	8.44	9.22	4.00	4.37		
AS OF 1994-95	—	—	—	—	—	—	—	—	—	—	—	7.87	8.77	—	—		

(b) SECTIONWISE SPECIFIC STEAM CONSUMPTION

COST CENTRE	UNITS	AGRA	AGRAJA	ANUJA	ABJA	ALPAMA	DIGESTORS	BLOWN	EVAPD	ATOPS	CAUSTIC-REPAIRATOR	BLEACH	BLEACH	COATING	STOCK	SEDA	SEDA	
		T	T	T	T	T	T	KG of WATER REL. EVAPORATION	KG OF GL	KG OF WRITER	T of PULP	T of PULP	T of PULP	T of PULP	M/C PROD	REC. MP	REC. UP	
TODAY	Consumption	90	216	244.0	37.0	297	331	325			122	359	34.0	65	1	6	120	72
	Production	26.5	70.0	66.2	9.2	126.0	30	2240			1080	3251	201.5	87	0	297.9	640	640
	Spec.consum	3.40	3.09	3.69	4.02	2.36	11.03	.15			.11	.11	.17	.75	849	.02	.19	.11
TILL DATE	Consumption	845	2119	2136.0	374.0	2376	3183	3183			1302	3248	3751.0	815	62	59	1731	666
	Production	233.8	652.7	536.2	96.6	1018.5	276	21820			11240	31556	15751.5	890	24.82	2538	6552	6552
	Spec.consum	3.61	3.23	3.98	3.87	2.33	11.53	.14			.12	.10	.19	.90	3.50	.02	.26	.10
AVERAGE	Consumption	79	223	214	29	248	322	292			110	315	56	—	—	—	—	—
CONDENS OF	Production	21.0	63.0	60.0	9.0	104.0	27	2094			1070	2948	1.81	—	—	—	—	—
1994-95	Spec.consum	3.76	3.34	3.57	3.22	2.38	11.93	.14			.10	.11	.31	—	—	—	—	—

II FUELS : TOTAL & SPECIFIC CONSUMPTION

	SM DUST T	LSHS MC	B.L. SOLIDS T	HED OIL K/LIT	COAL T	COAL VALLE KCAL/KG	EVAPORATION FACTOR	COAL FOR POWER M/C	COAL FOR FIN	COAL FOR PROCESSES M/C	COAL FOR FIN	COAL FOR T of PAPER M/C	COAL FOR FIN
TODAY	.00	.25	371	.00	511	.00	4.30	.817	.893	.899	.982	1.713	1.875
TILL DATE	30.8	11.0	3900	.0	4903	.0	4.35	.919	1.00	.97	1.06	1.893	2.068
AVERAGE	3.08	1.10	390.02	.00	480	—	—	—	—	—	—	1.893	2.068
BEST ACHIEVED	22.83	—	—	—	—	4319	4.76	.766	—	.86	.96	1.657	1.846

I WATER : a) TOTAL & SPECIFIC CONSUMPTION

	WATER PUMPED HED	DRAINS HED	DRINKING WATER HED	TOTAL WATER MC/T	PROCESS WATER MC/T	PROCESS WATER HED	EFFLUENT DISCHARGED HED	OVERHEAD TANK INPUT	BACK WATER RECLAIMED				
TODAY	11.95	.29	.83	182.44	197.39	10.82	165.34	180.70	9.75	148.81	162.63	10.02	2.59
TILL DATE	114.75	3.42	8.24	208.64	224.75	103.09	184.75	201.91	92.78	166.27	181.72	95.13	24.85
AVERAGE	11.48	.34	.82	—	—	—	—	—	—	—	—	9.51	2.49
Avg of 1994-95	11.40	.51	.82	302.13	220.72	10.07	178.55	194.97	9.06	160.70	175.47	—	3.00

b) SECTIONWISE SPECIFIC CONSUMPTION

	ASHA AHA	ASHA ANJA	P.MILL NEW CHIFFER MC/T	BLEACH PLANT 3	COATING PLANT	EVAPORATORS MC/KAL	CRUETI CISING MC/KAL	RECY. BOILER 2	RECY. BOILER 3	POWER HOUSE	STEEL & DS SETS	10 MM TURBINE	FIRE HYDRANT MC	DM WATER MC/T/STERN	UN MTRD MC/STERN
TODAY	Consumption .81	2.75	2.24	1.21	.030	1.64	.45	.112	.733	.16	0	0.000	.27	.42	.00
TODAY	Production 33.7	262.2	264.0	87	2240	1080	—	—	—	—	—	—	—	3251.0	—
TODAY	Spec.consum 102.19	47.70	38.59	63.25	3.33	1.90	—	—	—	—	—	—	—	.59	—
TILL DATE	Consumption 7.96	27.26	19.75	13.42	.48	17.72	4.39	1.15	1.48	1.58	.00	.00	2.71	5.19	-.00
TILL DATE	Production 330.4	2307.4	2408.8	690	21830	11240	—	—	—	—	—	—	—	31356	—
TILL DATE	Spec.consum 107.57	56.16	36.98	68.58	3.68	1.78	—	—	—	—	—	—	—	.75	—
AVERAGE OF 1994-95	Consumption .92	2.71	1.62	1.4	.04	1.66	.39	.14	.13	.13	.07	.01	.35	.51	0
AVERAGE OF 1994-95	Production 30.57	221.67	231.77	—	—	2061	—	—	—	—	—	—	—	—	—
AVERAGE OF 1994-95	Spec.consum 136.67	55.60	31.79	—	—	3.68	—	—	—	—	—	—	—	—	—

V CONDENSATE : a) SECTIONWISE CONDENSATE RECOVERY (PERCENT)

	DIBEST EPS	STEEL	10MM	EVAPORATOR	ASHA M/A	ASHA M/A	M.F. & ANUPPA COND.	TOTAL WATER	MHELP	BLOW DOWN
TODAY	63.1	100.0	100.0	86.9	55.1	50.9	68.6	63.9	36.1	.3
TILL DATE	59.2	100.0	100.0	88.2	53.4	50.9	69.6	62.0	38.0	.3
BEST ACHIEVED	71.2	100	100	95.8	56.4	65.33	74.48	65.33	34.47	.31

VI COMPRESSED AIR

	RM.HRS		
	HEK	OPT	HEK BMT.
POWER BLOCK	72	24	120
PAPER M/C	72	0	72
TOTAL	144	24	192
BEST ACHIEVED	216	24	—

VIII. TOTAL ENERGY CONSUMPTION (GIGA JOULE

	TOTAL 6. JOLLES	6. J/T M/C	6. JOLLES EXCLUDING 6. J/T (M/C)	RATIO PURCHASED SELF
TODAY	13184	44.26	8275	28.11
TILL DATE	128654	50.69	79025	31.14
AVERAGE	12865	50.69	7902	31.14
BEST ACHIEVED	—	—	—	—

VII a) PURCHASED ENERGY COST

	GRID	COAL	HED OIL	LSHS	TOTAL FUEL COST	COST/T FUEL	COST/T OF FUEL
	Rs/MM	Rs/T	Rs/K.L	Rs/T	Rs/T	Rs/T	Rs/T
TODAY	21000	58996	0	1348	791904	2638	79056
TILL DATE	1971000	5456308	0	59231	7486339	2850	7427308
AVERAGE	197100	545621	0	5933	748654	2850	757537

REMARKS:

performance executive committee meetings for identifying areas of improvement and for effective action to implement the same.

- M/s. APPM has entered into an annual contract with M/s. Forbes Marshall for periodical survey and monitoring of steam traps for proper upkeep repair/replacement of defective units.

Measures taken to create awareness among the employees with regard to energy conservation are:

- Sponsoring of various officers from the plant to attend training programmes and seminars on energy management.
- Employee development special programmes are undertaken to impart importance of energy conservation in our workmen.
- In house training programmes are conducted with regard to combustion efficiency and boiler operation for boiler operators.
- We have engaged consultants for detailed energy audit study of the mills involving employees of all sections and departments to associate themselves in identifying energy saving proposals.
- We have conducted energy cost improvement conference with the participants of all the technical staff members of the mills from various sections inviting suggestions through brain storming session.
- We are involving through suggestion, schemes on energy cost improvement and rewarding the best suggestions.
- We are conducting a week long energy conservation celebrations in the month of December every year. Conducting various competitions on energy is slogans, posters etc.

Details of various energy efficient modernisation and energy saving projects implemented in APPM:

Free Flow Falling Film Evaporators:

To evaporate water from about 2500 M³/day of Black liquor generated, we had conventional type of **quintuple effect short tube evaporators** system.

The system has the poor steam economy and for cleaning purpose frequent body change was required. Also chemical losses are more due to frequent water boiling.

APPM has installed and commissioned in 1987 at the cost of Rs. 3.69 crores, the most modern **7 effect free flow falling film evaporator**. The system was supplied by M/s. Rosenblad, U.S.A. The water evaporation per ton of steam has increased from 2.8 T to 6.0 T which resulted in the saving of 100000 T of LP steam. Savings per annum in the year of installation is Rs. 195 lakhs. Savings with the 1995-96 average energy cost works out to Rs. 344 Lakhs.

High capacity and high efficiency Veco Plan chippers:

The chip preparation plant consisted of a number of "Disc Chippers". The system has the deficiency of high specific power consumption (21 Kwh/T) and manual feeding. Two Nos. of **Vecoplan make drim chippers** are installed and commissioned (one in 1981 and one in 1991) at a cost of Rs.2.4 crores to improve the quality of the chips and energy performance.

The specific power consumption has come down to one third (7 Kwh/T) of the original consumption (22 Kwh/T) with reduced dust generation in addition to the increase in capacity. The resultant power saving is 28.5 lakhs kwh. Savings in the year of installation is Rs. 50 lacs. Savings with 1995-96 average energy cost works out to Rs. 98 Lakhs.

Replacement of open draw press by trinip press for Paper Machine No.5:

At No.5 (Anupama) paper machine APPM had semi-modern press section where in the dewatering of the sheet is done in first pick up-cum suction press and second straight through press. At higher speeds this type of press would develop sheet wrinkles, ceases in nip and frequent sheet breaks. APPM rebuilt this machine with trinip press of M/s. Over Mehanica. Italy into closed draw press section by replacing the open draw press at a cost of Rs. 3.21 crores, which was commissioned in 1988. This improved the sheet dryness after the press from 38% to 42%.

With this installation the specific steam consumption has reduced from 3.5 T/T to 2.42 T/T of paper resulting in steam saving of 36715 T. Savings in the year of installation is Rs. 92.5 lakhs. Savings with 1995-96 average energy cost works out to Rs. 141 lakhs.

Conversion of stoker fired boilers to fluidized bed combustion system and utilization of saw dust in the same:

The four old stoker fired boilers had been designed to work on high calorific value coal (4780 K.cal./Kg.) with low ash content. Due to non-availability of this coal, the boilers are to be fired with low calorific value and high ash content coal resulting in the downfall of capacity and efficiency.

APPM had modified the two nos. Stoker fired boilers into Fluidized Bed Combustion system boilers in the year 1990 and 1991 at a cost of Rs. 2.7 crores. The steam generation capacity and efficiency improved from 14 TPH to 27 TPH and 65% to 78% respectively.

This has resulted in the savings of 5639 T of coal. Savings in the year of installation is Rs. 53 lakhs. Savings with 1995-96 average energy cost works out to Rs. 64 Lakhs.

Also this conversion has resulted in utilising the saw dust, a waste generated in the chipping section, which has calorific value of about 3000 K.cals/Kg. in the boilers resulting in the saving of about 3069 T of coal per annum. Savings in the year of installation is Rs. 28 lakhs. Savings with 1995-96 average cost works out to Rs. 45.7 lacs.

The total savings in the year of installation is Rs. 81.48 lakhs and on 1995-96 average cost works out to Rs. 110 lacs.

Improved co-generation with installation of 10 MW TG set:

APPM has three TG sets installed in the mill. They are one unit of 5 MW extraction back pressure, 1 MW back pressure unit and 5 MW pure condensing unit. The total generation from the extraction cum back pressure turbine was around 4.8 MW catering the process steam demand. The

excess steam required was supplied through pressure reducing station with out getting the benefit of co-generation. The total power requirements is about 18 MW

APPM has installed a double extraction cum condensing TG set of 10 MW supplied by M/s. TC GMB, Gorlitz of Germany in the year 1991 at a cost of Rs. 7.8 crores. This has resulted in the additional captive power generation. Savings in the year of installation is Rs. 177 Lakhs. Savings with 1995-96 average energy cost works out to Rs. 335 lakhs.

Further the set has an inherent capacity of 12 MW. Rebuilt/modernization of the TG set is carried out with an investment of Rs. 35.0 lakhs in 1995-96 resulting in increased power generation of 49.5 Lakhs Kwh per annum. Savings with 1995-96 average energy cost works out to Rs. 86.1 lakhs.

Paper Machines Back Water Reclamation System:

Paper Machines discharge around 3 MGD of effluent water per day which cannot be reused in the same plant.

APPM has installed a reclamation system with investment of Rs. 30 lakhs in the year 1994. The water is collected in the sedimentation tank and clarified through clarifoculator. the reclaimed water is being used at pulp mill resulting in the reduction of fresh water consumption by 2.6 MGD. Savings in the year 1994-95 is Rs. 14.5 lakhs. Savings with 1995-96 average energy cost works out to Rs. 15.0 Lakhs.

Modernization of Paper Machine No.3:

Paper Machine No.3 is rebuilt in March, 1996, with a continuous stock preparation system, high efficiency screens, low pressure drop centricleaning system, installation of high efficiency bi-nip press followed by straight through press to increase the dryness of paper and there reducing thermal energy and installation of sectional drives in place of line shaft drive to improve the efficiency of the machine.

The projected invest for the same is Rs. 2577 lakhs and savings envisaged per annum is Rs. 791

lakhs. Further many Energy Conservation schemes are implemented in APPM and the list of the same indicated below:

- Installation of 170 TPD Black Liquor Solids firing capacity boiler in 1994 with cost of Rs. 13 crores, which resulted in increase in the specific steam generation from 2.2 T to 2.7 T per ton of BL solids.
- Installation of Bleach Plant in 1994 with cost of Rs. 14 crores which has the Chlorine back water reutilization system.
- Installation of online Moisture, Basis Weight and ash control system for paper Machines 2, 3 & 5 and CD caliper control system for Paper Machines 3 & 5 with an investment of Rs. 8.48 crores to improve the efficiency and to maintain optimum specifications of the paper.
- Installation of high efficiency vertical turbine pumps at river water pump house with an investment of Rs. 15 Lakhs.
- Installation of D.C. motor in place of steam turbine for Paper Machine No.2.
- Reducing speed and trimming of the impellers of the identified pumps and fans.
- Insulation of the blow tanks and steam piping with proper upkeep.

Energy Conservation proposals under active consideration are:

The following energy conservation proposals are in active consideration:

- Installation of energy efficient, most modern 300 TPD capacity Brown Stock Washing System to give better quality of pulp, low chemical losses and energy efficiently.

- Installation of a 60 TPH capacity Fluidized Bed Combustion system coal fired boiler.
- Unitization of compressors.
- Replacement of low efficiency vacuum pumps with high efficiency vacuum pumps.
- Installation of variable speed drives for fans.
- Installation of online steam trap monitor with spiratoc sensor chambers for daily monitoring of steam traps.

TO SUM UP

- Energy is indispensable input for industrial activity and National growth.
- APPM top management is committed to energy conservation and success of energy improvement programmes.
- Awareness of energy conservation is brought to Employees through various measures like training, energy conservation week celebrations, rewarding energy saving suggestions etc.
- Computerized daily energy performance monitoring system for effective control and improvement.
- consultants engaged for detailed energy audit and identification of energy improvement proposals.
- Feasible energy conservation proposals implemented.
- House keeping and improved co-generation are achieved.
- Constant quest for further improvements and energy performance by APPM to keep abreast with modernisation for energy conservation is practised.