An Approach Paper on How to Realise Integrated Sugar/ Paper Mill Complex to Lower Inputs Costs

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ABSTRACT

"The problem facing the paper industry particularly for large plants is that paper is not treated as the best business for private sector looking at the return. high input costs and kind of resources that need to be emoloyed. The state Governments are burdened with with expenses almost equivalant to the revenues and hence cannot employ reseurces for promotion of big size paper projects whereas the country is importing paper as we l as pulp.

In this kind of situation the problem is to be solved with a bold and imaginative approach.

Fromotors fund perhaps can be provided by some kind of central institution which provides seed capital otherwise we may land up in a situation of ever increasing import and shortages"

INTEGRATED SUGAR PAPER MILL— SAVING IN STEAM AND POWER

1. Bagasse as a raw material for writing, printing and craft paper etc. is already acceptable and its use for Newsprint has been demonstrated by TNPL. Further with the excise relief available this in the next decade will be the most important raw material what with the ever scarce foreign exchange reserves
2. Hence to meet 75–80 percent raw material requirement of the paper plant and the need to optimise the input cost for paper manufacturing in which fuel is a major cost centre the integrated concept of sugar-paper mill will be the order of the day. The integrated sugar-paper concepts can be of two types :

   Where the existing sugar factories join in a cluster with a paper plant as in TNPL. In such a case the possibilities are that these sugar factories substitute bagasse as fuel by some alternative fuel like coal, agriculture residues or they continue with their existing process. The decision would depend on the prospects of establishing workable and economical linkages. However, the minimum steps to be taken in those factories are :

   Balancing their plant at 45 steam percent cane. Dry mill wet bagasse utilising boiler flue gases to get higher boiler efficiency and save in form of bagasse fibre which is economical from the transportation point and perhaps can be directly used by the paper plant without depithing.

   Sugar-paper mill are located in a complex. Here the steps to be taken are :

   The sugar mill will dry its bagasse, using boiler flue gases such that 70 percent of the bagasse in form of fibre will be used in the paper mill directly. The 30% Fines will be burnt in the boilers

This technology will have to be examined against depithing in an integrated sugar-paper plant but will be of tremendous use in case of distantly located sugar factories from the paper plant.

The energy consumption of the sugar mill should not exceed 45 steam percent cane.

The boilers should be of 600/900 psig.

All the prime movers will be electric motors in the sugar mill as well as the paper mill.

The process steam requirement for sugar as well as paper will be met through extraction/condensing TG sets. The capacity and specification of the extraction/condensing TG set will be dictated by the process requirement and para meters.

The power for the prime movers will be met mainly from the condensing TG sets only.

An integrated sugar-paper mill including the above technologies along with steam, power distribution and process control being managed by an integrated microprocessor based system will result into the maximum energy efficiency and minimum operative cost.

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The size of the paper plant will be decided on the basis of the cane availability in the area or where there are smaller sugar factories of below 2000 tons they can be merged into either a bigger factory or can be integrated to the paper mill which may result into slightly higher cost. Please refer Table 1 for general reference.

3. Thus the fullest potential of the sugar factory to save/provide complete raw material for paper, generate surplus power by co generation and utilising its investment in power generating equipments around the year instead of merely using them only during the cane crushing season which constitute almost 30% of the investment will definitely be better economics.

4. The Technology inputs to achieve the above objectives in the sugar plant are enclosed vide Annexure 1. National scenario of Bagasse saving potential is enclosed vide Annexure II. The technology and Policy linkages to achieve the objective are enclosed vide Annexure III. Advantages in national scenario are enclosed vide Annexure IV.

5. The technologies like high pressure boiler, extracting/condensing TG set, Bagasse dryer, Microprocessor based control system and know how for optimising steam and material balance are available in India by virtue of which the sugar factories can increase value added from the same sugar cane to more than 150% by additional revenue from surplus power and bagasse fibre for paper eg. in Hawaii a sugar plantation earns more out of power than sugar. Hence providing bagasse and power for paper plant in an effective manner will help reduce its vulnerability due to higher value added from sugar cane. They will pay better cane price and hence ensure loyalty of the Farmers to provide assured and ever increasing supply of sugar cane.

6. From the Table 1 it may be observed that a 50 ton paper plant can be totally supported for its raw material requirement from a cane crush of 5.25 lac ton in a sugar plant of 3500 tons per day. Besides this it will also generate 6.5 MW of surplus power in the season and about 15 MW in the off season for the use of the paper plant. The total coal requirement in this case for the entire year will be 1,40,000 tons. Likewise in the same table it is shown that 7500 ton sugar plant can support a 200 ton per day Newsprint plant. In these cases the entire sugar mill fuel requirement has been substituted by coal except to release bagasse Fibre for paper. The dry Fines will be burnt in the boilers.

TABLE—I

BASED ON THE USE OF MODERN TECHNOLOGIES IN SUGAR FACTORIES THE FOLLOWING IS POSSIBLE ON THE BASIS OF 330 WORKING DAYS AND 80 PERCENT BAGASSE USE

1	Paper Plant capacity (TPD)	50	200
2	Cane crushed (in lac ton)		
	2.1 100% fuel substitution	5 25	10
	2 2 No fuel substitution	14	30
3	Cane crushing capacity (TCD) (150 days)		
	3.1 100% fuel substitution	3500	7500
	3.2 No fuel substitution	9300	20000
4	Surplus power potential from Sugar facto.y from 100% fuel substitution		
	4.1 In season	6.5	10
	4.2 In off season	15.8	22
	4.3 Coal requirement (in ton)		
	4.3.1. In season	45,000	64,000
	4.3.2. In off season	88,250	1,26,000
	4.3.3. Total	1,33,250	1,90,000
5	Surplus power potential from Sugar factory		
	5.1 With no fuel substitute in season	17.5	27
	5.2 With alternate fuel in off season	40	60
	5.3 Coal requirement (ton)		
	5.3.1 In season	—	—
	5.3.2 In off season	2,40,000	3,20,000

Note : The process steam requirement for paper not considered.

7. Table II enclosed gives the potential for Bagasse fib saving and surplus power for paper based on the efficiencies to be achieved through the use of modern technology in different capacity plant right from 2500 TCD to 7500 TCD.

TABLE—II

SURPLUS POWER AND BAGASSE SAVING BY 45 STEAM PERCENT CANE AND BAGASSE DRYING

ICD	ICD 22 -TCH	Steam/ hour 45 steam % cane	Co Generation power-6T/MW	Surplus in season	Power off season	Cane Crushed 15 days (Lac Ton)	32% Bagasse Generated (Lac Ton)	Fibre 70% (Lac Ton)	Fines 30% (Lac Ton)	Bagasse saved on 50% Moisture Basis without fuel substitution	Bagasse saved on 50% Moisture Basis with fuel substitution
2500	114	52	8.6	5	11.5	3.75	1.20	1.02	0.36	0.45	1.02
3500	160	71.5	11.9	6.9	15.8	5.25	1.68	1.30	0.50	0.63	1.30
5000	225	102	17	10	22.5	7.50	2.40	1.84	0.72	0.90	1.84
7500	340	153	25	15	34	11.25	3.6	2.52	1.15	1.35	2.52

CONSIDERED

- 600 PSIG 850 Degree F Boilers
- Extraction/condensing IG set
- For Sugarprocess steam at 20 PSIG

NOT CONSIDERED

- Potential for extracting process steam for paper

ASSUMPTIONS

- Exhaust steam for sugar — 20 PSIG
- In season TG set steam consumption — 6T/MW
- In off season TG set steam — 4.5 T/MW
- In off season Boiler has been taken to generate as much steam as in season

Note : Though process steam for paper not considered however if the surplus power in off season is in excess of the requirement for paper plant it can be used for irrigation and/or steam extracted for processing of paper.