

AGENDA NOTE FOR  
HPC BOARD MEETING

Sub: Installation of Falling Film Evaporator, Removal of Cascade Evaporator and Extension of Economiser Area by Retrofitting the Chemical Recovery & Evaporator Plant at Cachar Paper Mill.

Back Ground

1.0 The Board in its 137<sup>th</sup> meeting held on 05.02.1996 approved the proposal for

- a) Installation of (2+1) falling film evaporator additionally to the existing LTV evaporators to raise the concentration of Black Liquor solids to 65% - 68% total solids before firing to the boiler.
- b) Removal of Cascade Evaporator.
- c) Extension of Economiser Area/or Installation of Air Pre-Heaters

at a total cost of Rs. 650 lakhs per mill for NPM & CPM to improve steam economy, Firing Liquor Concentration, Increased Steam Generation, reduced Furnace Oil Consumption and enhanced ESP life.

1.1 The project activities thus initiated after the Board approval, had to be kept in abeyance due to depressed paper market conditions and lower realization. However, considering the benefits/savings expected, the Scheme was revived for NPM with a budget outlay of Rs. 11.07 crores by diverting the approved estimated amount of Rs. 6.50 crores earlier earmarked for CPM.

1.2 The Board in its 156<sup>th</sup> meeting held on 20.01.2001 approved the proposal of Falling Film Evaporator / Chemical Recovery Boiler modification proposal for NPM. The project has since been commissioned successfully at NPM in December 2001.

2.0 Present Proposal

2.1 In the light of the benefits obtained at NPM and the original 137<sup>th</sup> HPC Board approval for similar installation at CPM, it is proposed to seek re-approval of the Board for :

- a) Installation of (2+1) Falling Film Evaporator additionally to raise the concentration of Black Liquor Solids to 70% total solids before firing to the boiler.
- b) Removal of Cascade Evaporator.
- c) Extension of Economiser area and / or installation if Air Pre-Heaters.

at a total cost of Rs. 1500 lakhs.

**HINDUSTAN PAPER CORPORATION LIMITED  
CACHAR PAPER MILL, PANCHGRAM**

June 15, 2003

**Sub : Installation of Falling Film Evaporator, Removal of Cascade Evaporator and Extension of Economiser Area by Retrofitting the Chemical Recovery and Evaporator Plant at Cachar Paper Mill.**

The above scheme will be able to draw following benefits :

- Being an energy-efficient project, will be able to reduce energy consumption.
- Consumption of Coal will be reduced by sizeable extent.
- Reduce Green House Gas (GHG) emission to the atmosphere.
- May help HPCL to register this project as a Clean Development Mechanism (CDM) Project under Kyoto Protocol when it comes into effect and thus obtain financial benefit through carbon trading.

Since the benefits achieved on installation of the above project is evident at NPM, we may go for similar project at CPM.

Submitted for kind consideration.

GM (PCF)

CE, CPM - on tour

D(O)

  
DGM (U)

**Sub: Technical/Financial benefits derived out of the installation of Falling Film Finisher Evaporator and Extension of Economizer Area in Soda Recovery Boiler at Cachar Paper Mill**

**1.0 Financial Gain due to Guaranteed Higher % Solids (67.4%) compared to existing concentration of 60% solids**

- Difference in heat loss at 60% and 67.4% BLS due to latent heat of water  

$$\left\{ \frac{40}{60} - \frac{32.6}{67.4} \right\} \times 2501.6 \text{ kJ/kg} = 457.6 \text{ kJ/kg}$$
- Gain in steam generation at 60 kg/m<sup>2</sup> and 400 °C per day on 525 MT BLS  

$$\text{Firing} = \left\{ \frac{457.76 \times 525 \times 1000}{2563.5} \right\} \text{ MT} = 93.75 \text{ MT}$$
- Yearly benefit at 67.4% BLS compared to 60% BLS firing = 93.75 MT × 330 days = 30937.5 MT
- Corresponding coal (steam:coal = 6.8:1) =  $\frac{30937.5}{6.8} = 4549.63 \text{ MT}$
- Financial benefits @ Rs. 2200/ MT of coal = Rs. 2200 × 4549.63 = Rs. 100.09 lac
- Anticipated gain with 67.4 % TS ≈ Rs. 100 lac per annum

**2.0 Financial gain due to guaranteed higher steam economy (compared to the previous steam economy of 4)**

- Water evaporation = 123.26 MT/hr (on 24 hours basis)
- With steam economy of 4.0 and 5.23, savings per hour =  

$$\left\{ \frac{123.26}{4} - \frac{123.26}{5.23} \right\} = 7.25 \text{ MT/hr}$$
- With 24 hours operations, savings per day =  $\left\{ \frac{24 \times 7.25}{6.8} \right\} \text{ MT} = 25.59 \text{ MT}$
- Financial saving @ Rs. 2200/ MT of coal = Rs. 2200 × 25.59 = Rs. 56298
- Annual savings with 330 days working = Rs. 185.78 lac with 100% utilization
- Annual saving anticipated at 90% utilization = Rs. 167.21 lac per annum ≈ Rs. 167 lac per annum

**3.0 Financial gains due to higher steam generation**

**Past Scenario:** (by utilizing old cascade evaporator for concentrating from 48% to 60%)

1. At 48% concentration to cascade inlet flue gas Nm <sup>3</sup> /sec flow	30.44
2. Flue gas inlet gas temperature °C	330
3. Flue gas outlet gas temperature °C	135
4. Flue gas enthalpy at Cascade inlet kJ/Nm	478.5
5. Total heat going out without generating steam from cascade (1X4) kJ/Sec	15317.8

**Future Scenario:** (by utilizing the above heat for generating steam by incorporating the proposed large economizers)

1. At 67.4% concentration of without cascade flue gas flow at inlet of economizer will be	Nm <sup>3</sup> /sec	27.63
2. Flue gas inlet gas temperature at large economizer inlet	<sup>0</sup> C	185
3. Flue gas enthalpy at large economizer inlet	kJ/Nm <sup>3</sup>	261
4. Total heat going out after generating steam from large economizer (Sl 1 X Sl 3)	kJ/sec	7211.43
5. Enthalpy of steam at 60 kg/cm <sup>2</sup> and 400 <sup>0</sup> C	kJ/kg	3178.2
6. Enthalpy of boiler feed water at 69 kg/cm <sup>2</sup> and 145 <sup>0</sup> C	kJ/kg	614.7
7. Difference in enthalpy (Sl 5 – Sl 6)	kJ/kg	2563.5
8. Additional steam generation (a.5-b.4)/(b.7)	kg/s	3.16
9. Additional steam generation (2.87 X 3.16)	T/hr	11.38
10. Corresponding coal (6.8:1)	T/hr	1.67
11. Total coal saving per annum (1.67 X 24 X 330)	MT	13254.35
12. Total cost of saving of coal per annum @ Rs. 2200/MT	Rs. say Rs.	291.59 lac 291 lac

**Potential CDM revenue**

Certified emission reductions per annum, considering 55% total carbon in coal [(4549+8250+13254) X 0.55 X (44/12)]	t CO <sub>2</sub>	52540
CDM revenue with CER price @ 8 Euro and 1 Euro at Rs. 54	Rs.	227 lac

**Benefit Analysis:**

**TANGIBLE BENEFITS (SUMMARY) WITHOUT CDM REVENUE:**

- |  |                |
|--|----------------|
| 1. Financial gain due to higher % solids:        | Rs. 100.00 lac |
| 2. Financial gain due to improved steam economy: | Rs. 167.00 lac |
| 3. Financial gain due to improved steam economy: | Rs. 291.00 lac |

Total financial gain: Rs. 558 lac

Payback period: Total project cost/Investment payback:  $1500/558 \approx 3$  years

**TANGIBLE BENEFITS (SUMMARY) WITH CDM REVENUE:**

- |  |                |
|--|----------------|
| 4. Financial gain due to higher % solids:        | Rs. 100.00 lac |
| 5. Financial gain due to improved steam economy: | Rs. 167.00 lac |
| 6. Financial gain due to improved steam economy: | Rs. 291.00 lac |
| 7. Potential CDM revenue                         | Rs. 227.00 lac |

Total financial gain: Rs. 785 lac

Payback period: Total project cost/Investment payback:  $1500/785 \approx 2$  years