



UNFCCC Secretariat
 Martin-Luther-King-Strasse 8
 D-53153 Bonn
 Germany

DET NORSKE VERITAS
 CERTIFICATION AS
 Veritasveien 1
 1322 Høvik
 Norway
 Tel: +47 6757 9900
 Fax: +47 6757 9911
<http://www.dnv.com>

Att: CDM Executive Board

Your ref.:
 CDM Ref 1475

Our ref.:
 KCHA/MLEH

Date:
 08 April 2008

Response to request for review

“Optimization of steam consumption in the process by installation of free flow falling film finisher evaporator and retrofit to the chemical recovery boiler in Cachar Paper Mill of Hindustan Paper Corporation Limited” (1475)

Dear Members of the CDM Executive Board,

We refer to the request for review of the project activity “Optimization of steam consumption in the process by installation of free flow falling film finisher evaporator and retrofit to the chemical recovery boiler in Cachar Paper Mill of Hindustan Paper Corporation Limited” (1475) and would like to provide the following response to the clarification requests raised by the review team.

Question 1:

Given the time gap between the decision to invest in the project activity and the commencement of validation even with the initial methodology used, the DOE should state with what level of assurance it considers that this project activity would not have been implemented without the CDM.

DNV Response:

DNV would like to emphasise that a DOE can only give a level of assurance to verifiable information, such as whether there is evidence that the CDM was seriously considered in the decision to proceed with the project activity. Based on the assessment of verifiable information against the requirements defined by the Board for assessing additionality, a DOE may express an opinion on whether it is likely that a project activity would not have been implemented without the CDM.

Proof of CDM consideration was assessed at the time of validation by DNV. The sequence of events and the consideration of CDM at different stages are presented chronologically in the following.

- The original proposal for installation of falling film evaporators at both CPM (Cachar Paper Mill) and NPM (Nagaon Paper Mill), was presented to the board on 5 February 1996. The proposal was put on hold due to poor financial condition of the organization and market scenario at that point of time. The poor financial condition of the organization was assessed from the audited performance report for the period 1996~2006.
- The project was revived and was initiated in phases. The project was approved for installation at NPM on 20 January 2001. The note from DGM (Engg.) dated 23 May 2000

was presented as a proof of CDM consideration in the project at NPM and was found to be in order.

- Post implementation of the project at NPM the project was approved for CPM on 18 July 2003 with due consideration of CDM in the decision making process. Communication from DGM (Utilities) dated 15 June 2003 was presented as a proof of CDM consideration and was found to be in order. (**Annex-I**)
- The project was implemented in the financial year 2003~2004. The annual report of the organization for the financial year 2003~2004 demonstrates that the project of installation of falling film evaporator at CPM was taken up as an energy conservation measure and not as a process optimization project. (**Annex-II**)
- The project was presented to a developer for taking the project forward under CDM in 2005 and communication from General Manager (engg.) to the project consultant dated 1 July 2005 was presented which was found to be in order. (**Annex-III**)
- DNV was contracted on 01 August 2006 for validation of the project and the initial version of PDD was on 02 September 2006 published for comments by Parties, stakeholders and NGOs.

The above sequence of events demonstrates that there is evidence that the CDM was seriously considered prior to the decision to proceed with the project. Hence, DNV can give reasonable assurance that the CDM was considered by the project participant during the decision making project for the project activity.

Question 2:

Clarification is required on how the DOE has validated the prohibitive nature of the barriers claimed.

Investment barrier:

In 2001 funds were reallocated from CPM to NPM to allow the funding of the project, this reduced available means to implement the project at CPM. Extracts from the minutes of meeting of the 173rd meeting of the board of HPC held on 18 July 2003, dated 24 July 2003, indicates that in light of the benefits that would be derived from the project the board approved the project for Cachar paper mill (CPM). The documents also established that the project activity at CPM had to be kept in abeyance after 2001 due to insufficiency of funds. (**Annex-VII**)

Other barriers:

The uniqueness of the project and technological barriers faced by the project has been assessed through third party references and publicly available technical literature. Before the implementation of the project activity, the finisher evaporator was a cascade evaporator that was a direct contact evaporator in which evaporation was affected by bringing hot flue gases from the recovery boiler furnace into direct contact with strong black liquor from the evaporator plant – the cascade evaporator was not integrated with the main evaporator body. Falling film evaporators under the project activity (installed as finisher evaporator to the main evaporator plant) are

- plate type with large number of lamella plates installed in segments and with a distributor for the liquid at the top
- integrated with the main evaporator body in a mixed feed arrangement.

Unlike most other integrated pulp and paper plant of similar scale, the Cachar Paper Mill of HPC has single line evaporation system, resulting in more dependability to achieve efficient and continuous operation of the evaporator plant.

Use of falling film evaporator with multiple effects ensures high heat transfer efficiency and is ideal for products with low scaling property. The main difficulties with falling film finisher evaporators are in maintaining uniform feed distribution and formation of scale. The technological difficulties, as elaborated below, encountered in the project activity owing to the reasons inherent to the use of bamboo as the only raw material for paper making. The use of 100% bamboo as raw material presents technical problems due to high silica content and solids in the black liquor as elaborated below. The external documentation received and used in assessment of the uniqueness of the project is listed below.

- Communication from M/s Enmas Ahlstrom Limited, dated 10 April 2000, confirms that HPC is the only paper and pulp manufacturing organisation to take up a falling film evaporation installation project in the country. There is no other 100% bamboo based paper and pulp manufacturer in India. (**Annex-IV**)
- A study report by Stephan Walker on “hardwood fibre and requirements of the Indian Pulp and paper industry”¹ indicates that there are no other 100% bamboo based plants in the world.

Technical barriers:

Efficiency of a free flow falling film (FFFF) evaporator depends on the utilization of the heat transfer area which in turn depends on the distribution of the feed on the lamella plates. In the project plant, due to the high silica content, this uniform distribution of weak black liquor is hindered, resulting in unequal wetting of the evaporator tubes and thus leading to lower efficiency at times. Moreover since the black liquor entering the evaporator train has substantial solids content, there is always a possibility for the distributor holes in the FFFF evaporator getting choked. Choking of the distributor holes causes non-uniform distribution of feed liquor from the top of the FFFF evaporator, leading to dry spot formation on the lamella plates. Dry spot formation can damage the lamella plates, thereby requiring welding at the damaged spots. The effect of high silica content and higher solid content has been validated from the following documents:

- Publicly available document, <http://www.sspindia.com/industrial-evaporators/index.html> , on suitability of falling film evaporator in clean service and susceptibility of performance of falling film evaporator to feed distribution and scale formation.
- Publicly available document, <http://www.p2pays.org/ref/10/09590.htm> , on high silica content of the feedstock and the same was further demonstrated through laboratory records of silica content of feedstock of the CPM plant.
- Recurring problem of tube choking and the trial run of reinstalled circulation pump for reduction of tube choking were observed during site visit and acknowledged to be a technological barrier to the project.

The above reference documents and observations of plant visit were found to be adequate to conclude on the prohibitiveness of the barriers faced by the project activity.

Question 3:

Clarification is required on how the DOE has validated that the project activity meets the energy savings threshold for small-scale projects.

The energy savings and the additional energy requirement for the project activity is as tabulated below

¹ 2006 Gottstein fellowship project , “hardwood fibre requirements of the Indian Paper and pulp industry” by Stephan Walker.

	Impact of the project activity	Reduction/increment in energy consumption GWh_{th}
Energy Savings	Lower LP steam consumption in the evaporator train	26.76
	Increased HP steam generation from the chemical recovery boiler	69.96
Energy consumption	Increased MP steam requirement as motive fluid in the steam jet ejector system of the evaporator plant	2.77
	Increased MP steam requirement for the purpose of soot blowing in the chemical recovery boiler	19.71
Net Energy savings	Total	74.24

The excel sheets for the calculations are attached as (**Annex-VI**).

We sincerely hope that the Board accepts our aforementioned explanations.

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION AS

Michael Lehmann

Michael Lehmann
Technical Director
International Climate Change Services

C Kumaraswamy

C Kumaraswamy
Manager – South Asia
Climate Change Services

ANNEX - I

**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.


DGM (U)

GM (PCF)


CE, CPM - on tour

D(O)

ANNEX – II

Information as per Section 217(1)(e) read with Companies (Disclosure of particulars in the report of Directors) Rules, 1988 and forming part of the Directors' Report for the period ended March 31, 2004.

I. CONSERVATION OF ENERGY

A) Energy Conservation Measures implemented at NPM & CPM

- i) Measures suggested by M/s DSCL Energy Services Limited implemented. In-house Energy Conservation Task Forces identified schemes in 2003-04 for conservation of power, water and steam. Energy Managers appointed at both NPM & CPM.
- ii) Schemes implemented :
 - Wet fly ash handling system to dry type;
 - Oxygen trimming control mechanism to reduce dry flue gas loss of C&C flaker heater;
 - Two stage heating (LP & MP) at recovery boiler etc.

B) Proposals Under Implementation :

Installation of

- Falling Film Evaporator at CPM;
- Centrifugal Air Compressor at NPM & CPM;
- Capacitor Banks at NPM & CPM;
- Cooling Towers and Separators for Paper Machine at NPM & CPM;
- Auto Control for Excess Oxygen Level in Flue Gas of CF Boilers at CPM.

ANNEX – III



हिन्दुस्तान पेपर कॉर्पोरेशन लिमिटेड
**Hindustan Paper
Corporation Limited**
(A GOVERNMENT OF INDIA ENTERPRISE)

75-C, PARK STREET ,KOLKATA - 700 016
GRAM : HINDPAPCO
PHONES : 2229-6901/2/06/07, 2249-6931/32/34/35
2226-3411
FAX : (033) 2249-4996 / 7335 / 4932 / 2216-6966
E-mail : chqmain.hpc@gems.vsnl.net.in
Website : www.hindpaper.com

July 1, 2005

To
M/s. Ernst & Young
22, Camac Street
Block 'C', 3rd Floor
Kolkata – 700 016.

Kind Attn.: Shri Indra Guha, Sr. Consultant


Sub: CDM Project in HPC Mills

Dear Sir,

Enclosed please find herewith brief outline of Four CDM projects implemented and under implementation in Nagaon Paper Mill, Jagiroad and Cachar Paper Mill, Panchgrame, Assam, prescribed format for your scrutiny please.

Thanking you,

Yours very truly,
for Hindustan Paper Corporation Limited


(K. Acharya)
General Manager (Engg.)

Encl: As above.

REGD. OFFICE : 4th Floor, South Tower, SCOPE Minar, Laxmi Nagar District Centre, Delhi - 110 092

ANNEX – IV



P0269C37

10th April 2000

The Dy. General Manager (T.S)
Hindustan Paper Corporation Limited
75C, Park Street,
Calcutta – 700 016

Sub : Installation of Falling Film Evaporator, Removal of Cascade Evaporator and Extension of Economiser Area by Retrofitting the Chemical Recovery and Evaporator Plant at your Mills.

Dear Sir,

Please refer your telecon the other day expressing your intention to go for the above project. Being associated with Ahlstroms World Wide Operation we can assure you that this project being energy – efficient one will be able to reduce energy consumption. Removal of Cascade Evaporator will help reduce Green House Gas emission to the atmosphere.

You may also note that only one paper mill in India so far has installed this plant. We confirmed, to the best of our knowledge, that no paper mill with 100% virgin bamboo pulp has so far taken up this project for implementation. In the process, if HPC intends to go for this plant they will become premier in the field.

Should you require any further information in this regard, we will be pleased to provide.

Thanking you,

Yours faithfully,
For Enmas Ahlstrom Limited

D Ravi
Senior Manager (Marketing & Proposals)

Enmas Ahlstrom Limited IV Floor, Guna Building Annexe, 443 (Old No. 304) Anna Salai, Chennai 600 018 INDIA
Registered Office : V Floor, Guna Building Annexe, 443 (Old No. 304) Anna Salai, Chennai 600 018
Tel 4338050/51 Fax 91 44 4322412 E-Mail: eal@vsnl.com

Bankers ICICI Banking Corporation Limited, Chennai, INDIA

ANNEX – V



केन्द्रीय लुग्दी एवं कागज अनुसंधान संस्थान
Central Pulp & Paper Research Institute

AN ISO 9001:2000 INSTITUTION

In pursuit of cleaner production, resource conservation & quality excellence
An autonomous organisation registered under societies Act under the administrative control of the Ministry of Commerce & Industry (Govt. of India)



DATE : 31.03.2008

No. CPPRI/CR/Energy/2007-08

TO WHOM SO EVER IT MAY CONCERN

M/s CACHAR PAPER MILL, PANCHGRAM, ASSAM, A UNIT OF HINDUSTAN PAPER CORPORATION LTD., IS USING MULI BAMBOO (*MELOCANNA BACCIFERA*), AS A MAJOR RAW MATERIAL FOR PRODUCTION OF WRITING & PRINTING PAPER.

TO THE BEST OF OUR KNOWLEDGE, BASED ON THE PROCESS AUDIT CONDUCTED IN THE MILL, IT IS THE ONLY MILL IN COUNTRY AND IN THE WORLD, USING MULI BAMBOO, WHICH IS ABUNDANTLY AVAILABLE IN NEARBY AREAS AND NORTH EASTERN STATES,

CPPRI OWES NO RESOPNSIBILITY FOR CHANGE OF RAW MATERIAL IN FUTURE BY THE MILL AND THIS CERTIFICATE HAS NO LEGAL OR STATUTORY BINDINGS ON CPPRI.

(DR. R.M.MATHUR)
SC-F AND HEAD
CHEMICAL RECOVERY AND
ENERGY MANAGEMENT DIV

Post Box No. 174, PAPER MILL ROAD, HIMMAT NAGAR, SAHARANPUR 247001 (U.P.) INDIA
Tel.Direct (0132) 2714050
Tel. EPABX (0132) 2714059 , 2714061, 2714062.
Cable: CEPPRI, Saharanpur, Fax (0132) 2714052, 2714054, website : www.cppri.org.in, Email : director@cppri.org.in

BASE OFFICE

752 - Ground Floor, Mathura Road, Bhogal, New Delhi
Phone -(011) 24375400, Fax.: 24375401

ANNEX - VII

mk

ITEM NO. 167:15

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 137th 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 156th 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 137th 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.



DGM (U)

GM (PCF)



CE, CPM - on tour

D(O)



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/m² 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 ³ /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 ³ /sec	27.63
2. Flue gas inlet gas temperature at large economizer inlet	⁰ C	185
3. Flue gas enthalpy at large economizer inlet	kJ/Nm ³	261
4. Total heat going out after generating steam from large economizer (SI 1 X SI 3)	kJ/sec	7211.43
5. Enthalpy of steam at 60 kg/cm ² and 400 ⁰ C	kJ/kg	3178.2
6. Enthalpy of boiler feed water at 69 kg/cm ² and 145 ⁰ C	kJ/kg	614.7
7. Difference in enthalpy (SI 5 – SI 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 ₂	52540
CDM revenue with CER price @ 8 Euro and 1 Euro at Rs. 54	Rs.	227 lac

Benefit Analysis:

TANGIBLE BENEGITS (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 BENEGITS (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