Appendix A[1] to the simplified modalities and procedures for small-scale CDM project activities

CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL SCALE PROJECT ACTIVITIES (SSC-PDD)
Version 01 (21 January, 2003)

Introductory Note

1. This document contains the clean development mechanism project design document for small-scale project activities (SSC-PDD). It elaborates on the outline of information in appendix B "Project Design Document" to the CDM modalities and procedures (annex to decision 17/CP.7 contained in document FCCC/CP/2001/13/Add.2) and reflects the simplified modalities and procedures (herewith referred as simplified M&P) for small-scale CDM project activities (annex II to decision 21/CP.8 contained in document FCCC/CP/2002/7/Add.3).

2. The SSC-PDD can be obtained electronically through the UNFCCC CDM web site (http://unfccc.int/cdm/ssc.htm), by e-mail (cdm-info@unfccc.int) or in print from the UNFCCC secretariat (Fax: +49-228-8151999).

3. Explanations for project participants are in italicized font *(e.g. explanation)*.

4. The Executive Board may revise the SSC-PDD if necessary. Revisions shall not affect small-scale CDM project activities validated prior to the date at which a revised version of the SSC-PDD enters into effect. Versions of the SSC-PDD shall be consecutively numbered and dated. The SSC-PDD will be available on the UNFCCC CDM web site in all six official languages of the United Nations.

5. In accordance with the CDM modalities and procedures, the working language of the Board is English. The completed SSC-PDD shall therefore be submitted to the Executive Board in English.

6. Small-scale activities submitted as a bundle, in accordance with paragraphs 9 (a) and 19 of the simplified M&P for small-scale CDM project activities, may complete a single SSC-PDD provided that information regarding A.3 (*Project participants*) and A.4.1 *(Location of the project activity)* is completed for each project activity and that an overall monitoring plan is provided in section D.

7. A small-scale project activity with different components eligible to be proposed[2] as a small-scale CDM project activity may submit one SSC-PDD, provided that information regarding subsections A.4.2 (*Type and category(ies) and technology of project activity*), and A.4.3 (*brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity)* and sections B *(Baseline methodology)*, D *(Monitoring methodology and plan)* and

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[1] This appendix has been developed in accordance with the simplified modalities and procedures for small-scale CDM project activities (contained in annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) and it constitutes appendix A to that document. For the full text of the annex II to decision 21/CP.8 please see http://unfccc.int/cdm/ssc.htm).

[2] In paragraph 7 of simplified M&P for small-scale CDM project activities, on clarifications by the Executive Board on small-scale CDM project activities, the Board agreed that in a project activity with more than one component that will benefit from simplified CDM modalities and procedures, each component shall meet the threshold criterion of each applicable type, e.g. for a project with both a renewable energy and an energy efficiency component, the renewable energy component shall meet the criterion for "renewable energy" and the energy efficiency component that for "energy efficiency".

E *(Calculation of GHG emission reductions by sources)* is provided separately for each of the components of the project activity.

8. If the project activity does not fit any of the project categories in appendix B of the simplified M&P for small-scale CDM project activities, project proponents may propose additional project categories for consideration by the Executive Board, in accordance to paragraphs 15 and 16 of the simplified M&P for small-scale CDM project activities. The project design document should, however, only be submitted to the Executive Board for consideration after it has amended appendix B as necessary.

9. A glossary of terms may be found on the UNFCCC CDM web site or from the UNFCCC secretariat by e-mail (cdm-info@unfccc.int) or in print (Fax: +49-228-8151999).

CONTENTS

A. General description of project activity

A.1 Title of the project activity:

Thermal Efficiency Improvement Initiatives in Coal Fired Boiler System

A.2 Description of the project activity:

(Please include in the description
- the purpose of the project activity
- the view of the project participants on the contribution of the project activity to sustainable development (max. one page).)

The purpose of the project activity is to improve the efficiency levels of the coal fired boiler, which provides process steam to the production departments of Jaya Shree Textiles (hereafter referred to as JST). Steam production is one of the most energy consuming processes in JST. The energy management team of JST devised energy efficiency improvement measures, which will utilize the heat value of coal efficiently to generate process steam and reduce heat losses.

The objective of the project activity is to implement measures, which would change the coal consumption patterns of the boiler system and result in direct Green House Gas (GHG) emissions reductions. The project activity is a positive step towards conservation of natural resource coal - a non-renewable resource.

Jayashree Textiles has process steam requirements of 4.8 ton/hr. They operate 'Fluidpac', a coal fired, water tube, single pass natural circulation boiler working on fluidized bed combustion principle for steam production. The 'Grade B[3]' coal is crushed to less than 10 mm size and fed to the bed combustion chamber.

The heat released during combustion is transferred to water in the water tubes situated in and above the combustion chamber.

Jayashree Textiles has taken initiatives to identify and technically upgrade their boiler system. The project activity includes energy efficiency measures adopted in the steam generating boiler system to reduce coal consumption and result in direct carbon dioxide emission reductions. The project activity is a small scale Clean Development Mechanism (CDM) project under the Category II B[4].

In the baseline scenario (before the CDM project activity was implemented) the Boiler System was operating to meet the steam requirement of JST without these energy efficiency measures in place. The

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[3] Grade B Coal with a calorific value of around 5800-6000 kcal & ash content of 19% from Raniganj mines

[4] Type IIB category is defined in the Appendix B of the Simplified modalities and procedures for small-scale CDM project activities – Indicative Simplified Baseline and Monitoring Methodologies for selected small scale CDM Project Activity Categories.

efficiency measures adopted are not common prevailing practices (Please refer Section B3 for further details).

The energy efficiency measures include

- Installation of bed modulation system
- Implementation of an automatic Furnace Draft control system
- Implementation of a Heat Recovery System of High Temperature High Pressure Machine

The implementation of energy efficiency measures have enabled the facility to reduce average coal consumption by 2200 tons / per annum. This reduction in coal consumption would result in approximately 5600 tons of CO_2 emission reduction per annum.

The project activity helps in 'sustainable development' by conserving coal – a finite natural resource.

The project activity also has excellent environment benefits in terms of reduction in carbon dioxide emissions and other pollutant emissions like CO, SO_2, NO_x that cause serious health problems.

Therefore, this efficiency improvement has local and global environmental benefits, which includes:

- Reduction in coal consumption
- Conserving coal, a non-renewable natural resource
- Making coal available for other important applications
- Reduction in CO_2 emissions;
- Reduction in dust emissions and other pollutant like CO, SO_x and NO_x; Air quality improvement;
- Reducing thermal energy losses;
- Reduction in adverse coal transport impacts, Hence an improvement in air quality and in the overall quality of the environment.
- Reduction in adverse coal mining impacts (dust and acid mine drainage)
- Reduction in electrical energy losses

JST is publishing a paper titled '*Innovative energy efficiency improvement measures in boiler system*' at well known energy forum as a step towards knowledge sharing and to further promote and encourage research in scientific, technological and productive developments.

A.3 Project participants:

(Please list Party(ies) and private and/or public entities involved in the project activity and provide contact information in annex 1 of this document.)

(Please designate one of the above as the official contact for the CDM project activity.)

- Indian Rayon & Industries Limited – Unit Jaya Shree Textiles
- Ministry of Environment and Forest, India (DNA)
- Official Contact: Indian Rayon & Industries Limited – Unit Jaya Shree Textiles

A.4 Technical description of the project activity:

A.4.1 Location of the project activity:

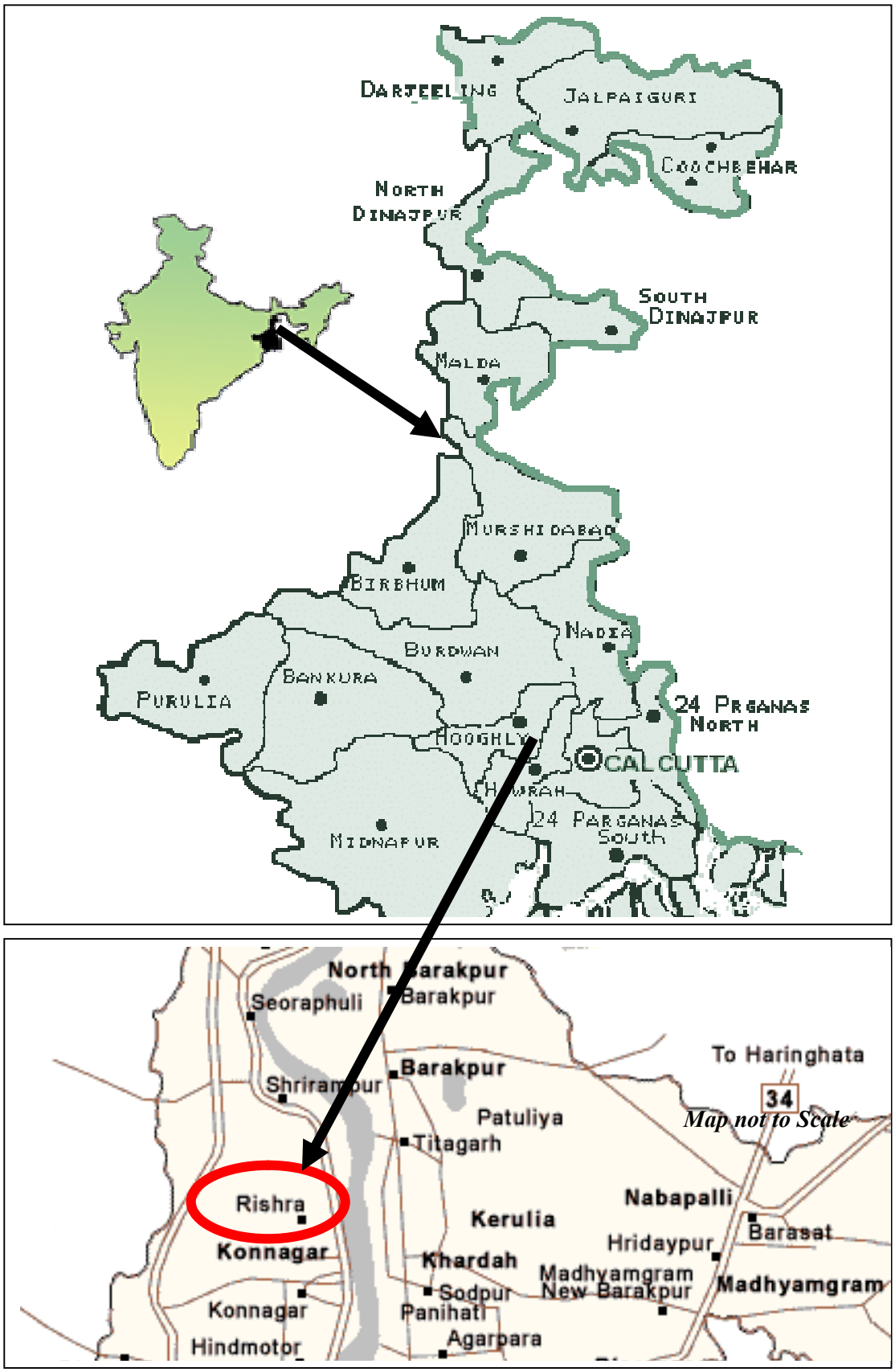
A.4.1.1 Host country Party(ies): India

A.4.1.2 Region/State/Province etc.: West Bengal

A.4.1.3 City/Town/Community etc: Rishra

A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity *(max one page)*:

The Project activity is implemented in the Coal fired Boiler System at Indian Rayon & Industries Limited Unit – Jayashree Textiles, Rishra, West Bengal India. The Coal fired Boiler System is located at the left side of the main service road of JST approximately 200m away from the main gate.


DARJEELING
JALPAIGURI
COOCHBEHAR
NORTH DINAJPUR
SOUTH DINAJPUR
MALDA
MURSHIDABAD
BIRBHUM
NADIA
BURDWAN
BANKURA
PURULIA
24 PARGANAS NORTH
HOOGHLY
CALCUTTA
HOWRAH
24 PARGANAS South
MIDNAPUR
North Barakpur
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Nabapalli
Kerulia
Barasat
Hridaypur
Konnagar
Khardah
Madhyamgram
New Barakpur
Madhyamgram
Sodpur
Konnagar
Panihati
Agarpara
Hindmotor

A.4.2 Type and category(ies) and technology of project activity

(Please specify the type and category of the project activity using the categorization of appendix B to the simplified M&P for small-scale CDM project activities, hereafter referred to as appendix B. Note that appendix B may be revised over time and that the most recent version will be available on the UNFCCC CDM web site.

In this section you shall justify how the proposed project activity conforms with the project type and category selected (for simplicity, the rest of this document refers to "project category" rather than "project type and category").

If your project activity does not fit any of the project categories in appendix B, you may propose additional project categories for consideration by the Executive Board, in accordance with paragraphs 15 and 16 of the simplified M&P for small-scale CDM project activities. The final SSC-PDD project design document shall, however, only be submitted to the Executive Board for consideration after the Board has amended appendix B as necessary.)

(This section should include a description of how environmentally safe and sound technology and know-how is transferred to the host Party, if such a transfer is part of the project.)

Main category - Category II

Sub Category - B

Justification concerning selection of the type and category of the project activity:

The project activity meets all the applicability criteria of small-scale CDM project activity category under Category-II: Energy efficiency improvement projects (B. ***Supply side energy efficiency improvements-generation***) of the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

As per the provisions of point 3 & 4 of Category IIB of Appendix B of **Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities [FCCC/CP/2002/7/Add.3, English, Page 21], Category IIB "**comprises technologies or measures to improve the efficiency of fossil fuel generating units that supply an electricity or thermal system by reducing energy or fuel consumption by up to the equivalent of 15 GWh per year."
"The technologies or measures may be applied to existing stations or be part of a new facility."

The project activity is a set of innovative efficiency improvement measures for the existing 12 Tons per Hour (TPH) boiler facility that meets the thermal energy (steam) demand of the JST plant. These measures

reduce 2,200 tons of coal per annum, with energy equivalent of 14.78 GWh/annum, which is below the required energy reduction cap of 15GWh/annum for the Small Scale CDM Project Activities.

Therefore the project activity falls under the Category II B of the Small Scale CDM Project Activities.

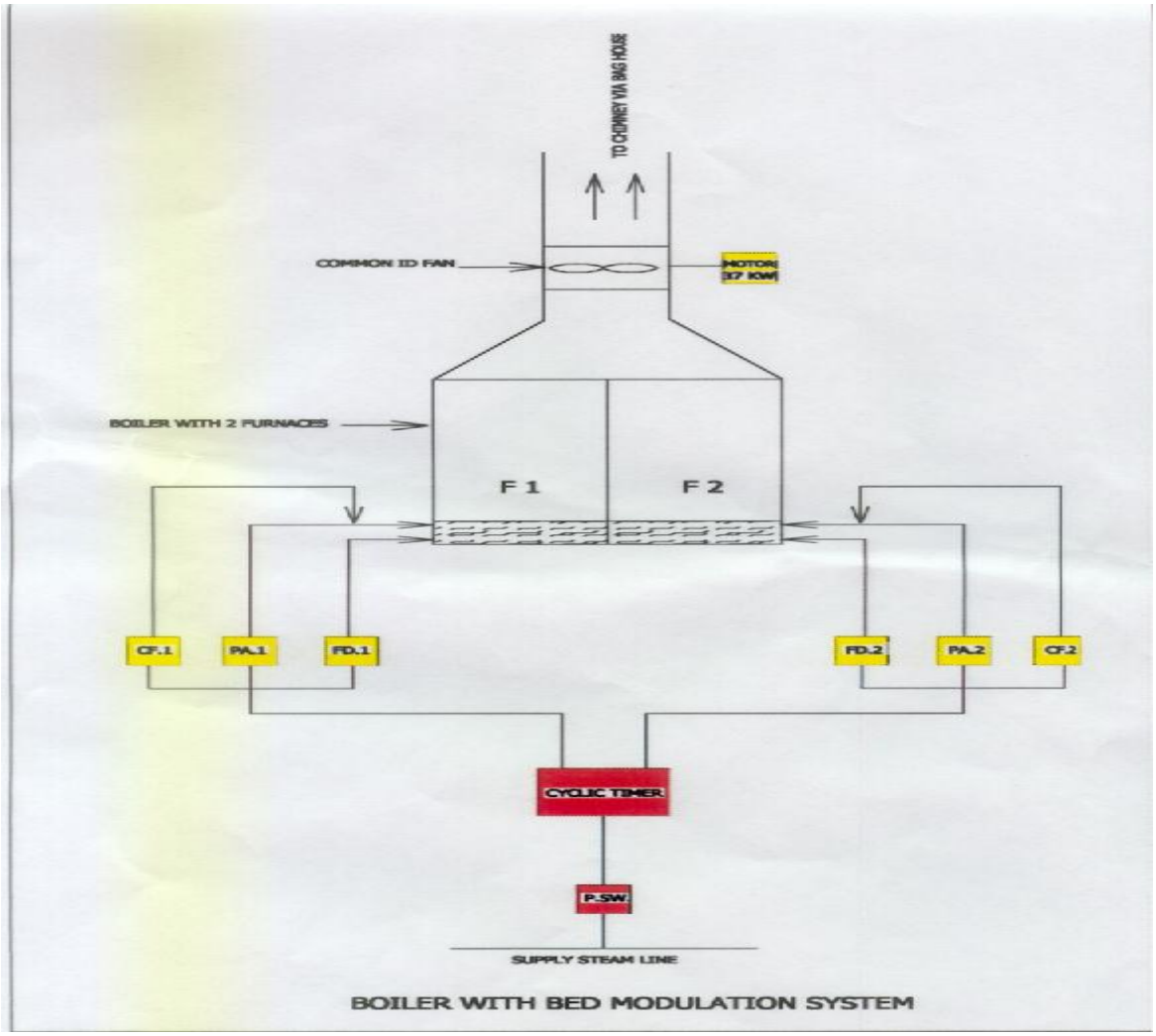
The baseline and emission reductions calculations from the project activity would therefore be based on point 3 & 4 of Category IIB of Appendix B. The monitoring methodology would be based on the guidance provided in the point 6&7 of Category IIB of Appendix B.

Technology to be employed by the project activity:

The project activity includes energy efficiency measures adopted in the steam generating boiler system to reduce coal consumption and bring about direct carbon dioxide reductions. The technology adopted to increase the efficiency of the boiler is environmentally safe and has reduced environmental stress locally and globally. To ensure operational benefits and GHG reductions the project activity would require to be supplemented by adequate preventive maintenance of boiler

The technologies adopted to improve the energy efficiency of boiler are detailed below:

- **Installation of bed modulation system**



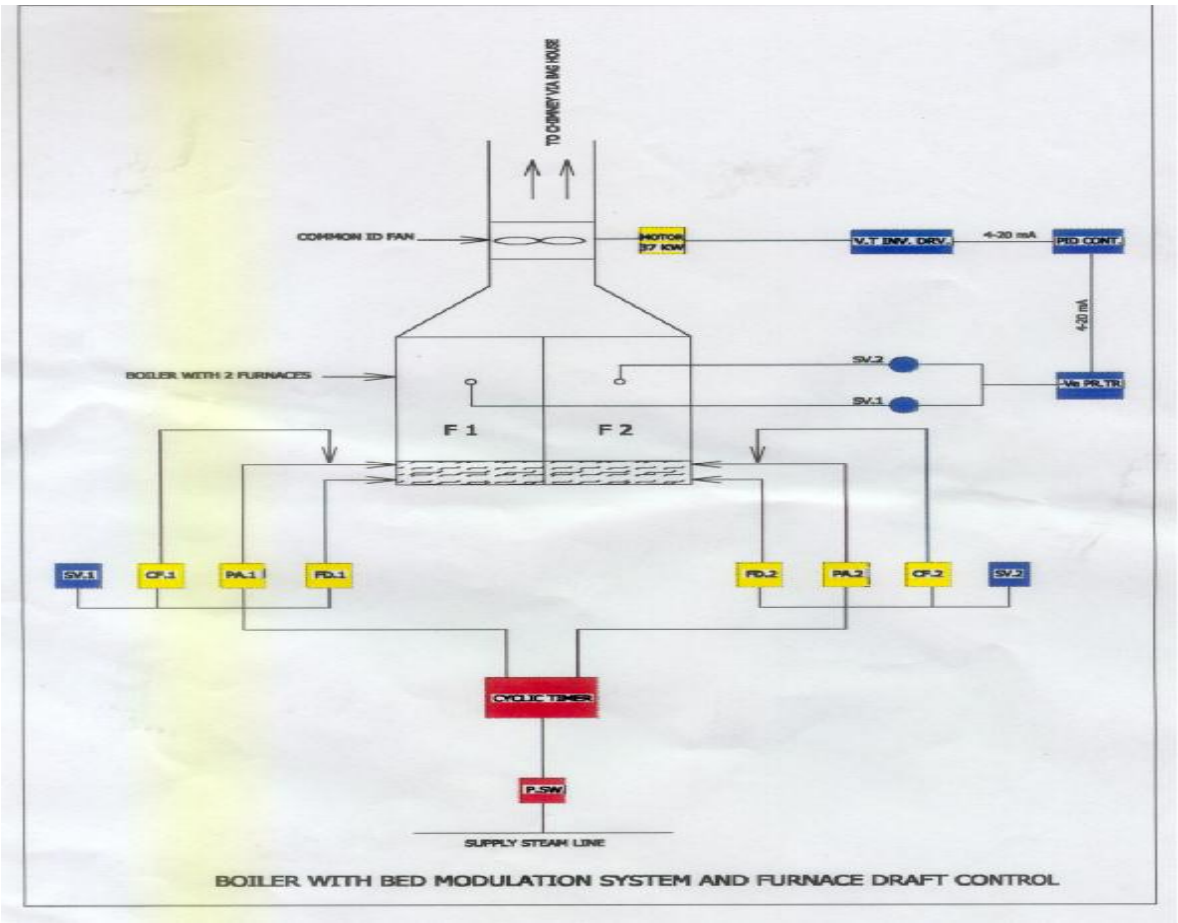
BOILER WITH BED MODULATION SYSTEM

The steam demand of JST fluctuates due to intermittent operation of steam consuming equipment and intermittent batch processing. The boiler of JST meets these intermittent variations in steam demand of the plant. With the decrease in steam demand, the steam discharge pressure inside the boiler would rise to the predetermined maximum level. In absence of project activity (*i.e.* installation of bed modulation system), at high discharge pressure the entire furnace system would shut down and flame height would reduce. The heat available from the lastly fed coal particles would not be transmitted to the boiler tubes. The time lag for entire system shut down would also result in wastage of heat energy at low steam demand and high discharge pressure. Similarly, with an increase in steam demand the steam discharge pressure would reach a predetermined minimum level. At low discharge pressure both the furnaces and its associated auxiliaries would be turned on simultaneously. The discharge pressure would drop further before rising due to the re-heating time lag.

At times steam demand reduces below 6 tons / hr during the day. During that period the boiler would attain maximum pressure very quickly and stop firing. This would result in frequent starts / stops of the firing system. This constant off and on of the furnace system further resulted in heat losses from the thermal mass.

After project activity implementation, the two beds of the boiler system are now made to run alternatively depending on the steam pressure and therefore the steam discharge rate. When high steam discharge pressure level is about to reach, one of the beds of the boiler is turned off. This 6 tons capacity of the boiler is utilised when low steam demand exists and as a result the efficiency of the boiler system is improved. The pressure switch on the steam discharge line at the outlet is set at 9.25 kg/cm^2 (g) (+/-1.75 kg/cm^2 (g)).
A cyclic timer is used to switch over from one bed to another bed. One chamber is allowed to operate for 5 minutes to prevent fire extinguishing and cooling of the furnace bed. The cyclic timer is set in such a way that both the beds operate with same duty cycle. The Induced Draft (ID) Fan with the help of an inverter drive would further maintain the bed temperature and furnace pressures through regulated induced draft and prevent heat energy losses in flue gases. (Details of the Furnace draft control is provided below). When the steam demand is high both the beds would operate jointly.

- **Implementation of an automatic Furnace Draft Control System**



The coal feed is varied from time to time due to bed modulation. In absence of Furnace Draft Control System (FDCS) excess air enter the combustion chamber. This entails greater consumption of energy when unnecessary additional air is heated and the heat energy is lost through flue gases. Reduced air input results in incomplete coal combustion. The FDCS regulates the air input and maintains the bed temperature in the furnace. This prevents excessive heat losses from the flue gases. The air input is maintained as required by regulating the speed of the boiler ID fan motor of capacity 37 kW automatically, depending upon pressure (-ve) inside the furnace. In the FDCS, the Variable Torque Inverter drive is installed to the rotor of the electric drive to operate it at a variable speed. Since the rotor can operate at any speed below its maximum, controlling the motor speed by a V.T. Inverter (instead of the throttling or damper control) varies the output.

- **Implementation of a Heat Recovery System for the High Temperature High Pressure Machines (HTHP)**

Seven yarn dyeing HTHP machines discharge 42900 litres of effluent with high temperature and pressure per day. 'Plate Type Heat Exchanger' recovers the heat energy of the effluent thereby reducing the plant's steam requirement and its associated coal consumption at the boiler system.

Implementation Schedule:

The project activity was implemented in three phases. The equipment installations for the 'Bed Modulation System' started in April, 2001. The zero date for CER calculations and quantification of CO_2 reduced for this project would therefore be April 2001. The 'Heat Recovery System' and 'Furnace Draft Control System' were implemented in September 01 and April, 02 respectively.

A.4.3 Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity:

(Please state briefly how anthropogenic greenhouse gas (GHG) emission reductions are to be achieved (detail to be provided in section B.) and provide the estimate of total anticipated reductions in tonnes of CO_2 equivalent as determined in section E. below.)

The Energy Department, Govt. of West Bengal encourages energy efficiency improvements but does not require industries to reduce their energy consumption to a prescribed standard. JST has developed the energy efficiency measures through in-house research and development. The project activity is a project specific innovation, which was devised to reduce coal combustion.

The objective of the project is to conserve thermal energy, its equivalent coal consumed for steam generation leading to reduction of corresponding CO_2 emissions in the flue gases. In absence of the project activity, the quantity of coal consumed to generate the required quantity of steam (at the required temperature and pressure) would be have been similar to coal consumed for the year 2000-2001 (base-year/before project activity implementation). The project activity has reduced thermal energy losses of the order of 12,673 million kcal per annum (1,26,737 million kcal for a period of 10 years) in the boiler system. The implementation of the project activity would amount to 2,200 tons of reduction in coal consumption (or 22,000 tons of coal for a period of 10 years) and CO_2 emission reduction of 5,600 tones per annum. This would amount to CO_2 emission reductions of 56,000 tonnes over the entire crediting period of 10 years. Without project activity, the thermal energy losses would continue, resulting in equivalent coal consumption and CO_2 emissions due to coal combustion.

This additional amount of reduction of anthropogenic emissions from thermal energy conservation would not occur in absence of the project activity.

A.4.4 Public funding of the project activity:

(Indicate whether public funding from Parties included in Annex I is involved in the proposed project activity. If public funding from one or more Annex I Parties is involved, please provide information on sources of public funding for the project activity in annex 2, including an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties.)

No public funding from parties included in Annex – I is available to this project.

A.4.5 Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

(Please refer to appendix C to the simplified M&P for the small-scale CDM project activities for guidance on how to determine whether the proposed project activity is not a debundled component of a larger project activity.)

The project activity is not a debundled component of any other large project. This has been verified as per the requirements of "Determining the occurrence of debundling" as given in Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities.

JST is not implementing any other project activity, which falls in the Category IIB[5] project category and deals with the same technology/measure at the factory premise.

[5] Type IIB category is defined in the Appendix B of the Simplified modalities and procedures for small-scale CDM project activities – Indicative Simplified Baseline and Monitoring Methodologies for selected small scale CDM Project Activity Categories.

B. Baseline methodology

B.1 Title and reference of the project category applicable to the project activity:

(Please refer to the UNFCCC CDM web site for the most recent list of the small-scale CDM project activity categories contained in appendix B of the simplified M&P for small-scale CDM project activities.)

Title: Category II - Energy improvement projects – AMS-II.B - Supply side energy efficiency improvements – generation

Reference: Category II (Energy Efficiency Improvement Projects) B (Supply side energy efficiency improvements – generation) - Appendix B of the simplified modalities and procedures for small-scale CDM project activities – Indicative Simplified Baseline and Monitoring Methodologies for selected small-scale CDM project activity categories.

B.2 Project category applicable to the project activity:

(Justify the choice of the applicable baseline calculation for the project category as provided for in appendix B of the simplified M&P for small-scale CDM project activities.)

As per the provisions of paragraph 14 of Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities [FCCC/CP/2002/7/Add.3, English, Page 21] the "Project participants may use the simplified baseline and monitoring methodologies specified in appendix B for their project category" if they met the following applicability criteria[6] :

1. Meet the eligibility criteria for small-scale CDM project activities set out in paragraph 6(c) of decision 17/CP.7[7];
2. Conform to one of the project categories in appendix B to this annex;
3. Not be a debundled component of a larger project activity, as determined through appendix C to this annex.

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[6] *Extract of paragraph 12 of Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities*

[7] *[6. (c) to develop and recommend to the Conference of the Parties, at its eighth session, simplified modalities and procedures for the following small-scale clean development mechanism project activities:*

(i) Renewable energy project activities with a maximum output capacity equivalent of up to 15 megawatts (or an appropriate equivalent)

(ii) Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15gigawatt hours per year;

Other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually;]

In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in this appendix (Appendix B) may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in attachment A of this appendix (B).

The project activity meets the 'Small Scale CDM Project Activities' applicability criteria.

(a) The project activity includes energy efficiency improvement measures in the boiler system that reduce (coal) energy consumption on the supply side and the reduction is within the upper cap of the small scale CDM project activity (i.e. up to the equivalent of 15 giga-watt-hours per year). Annual average coal consumption reduction per annum is to be of the order of 2200 tons (with energy equivalent of 14.78 GWh).

(b) The project activity conforms to "Category II B" project category in appendix B. The justification of the same has been provided in Section A.4.2.

(c) The project activity is not a debundled component of a larger project activity as determined through appendix C of Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities [FCCC/CP/2002/7/Add.3, English, Page 21].

The project activity also overcomes the operational barriers (b and c) listed in attachment A of Appendix B as required by the paragraph 28 of the simplified modalities and procedures for small-scale CDM project activities. The details of the barriers are enlisted in section B3.

Hence, the simplified baseline methodology (point 3 & 4 of Category II B) specified in appendix B for the project category Category II B has been used for determination of the energy baseline and the emission baseline of the project activity.

The guidance provided in Appendix B suggests the energy baseline that is the technical losses of energy in the absence of project be calculated as per the monitored performance of the existing generating unit before project implementation. The project activity reduces thermal energy losses and this reduction would be the difference in the energy losses that occurred before and after the project activity. The most appropriate method of estimating the technical losses that would have occurred in absence of project activity for the crediting period is based on the monitored performance of the boiler before project activity implementation.

We may therefore conclude that the baseline method adopted to calculate the baseline emissions for the project activity is both transparent and conservative.

B.3 Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity *(i.e. explanation of how and why this project is additional and therefore not identical with the baseline scenario)*

(Justify that the proposed project activity qualifies to use simplified methodologies and is additional using attachment A to appendix B of the simplified M&P for small-scale CDM project activities.)

(National policies and circumstances relevant to the baseline of the proposed project activity shall be summarized here as well.)

As mentioned above (section B2) the project activity fulfils all the criteria of small-scale CDM project and therefore is eligible to use the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories.

The Appendix B of the simplified M&P for small-scale CDM project activities's of the UNFCCC requires the project activity to determine its additionality as per the guidance provided in Attachment A to Appendix B.

As per the decision 17/CP.7 paragraph 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

In order to establish the project activity is additional, JST identified plausible project options, which include all possible courses of actions that could be adopted in order to generate process steam for the plant. These plausible options were further analyzed as per the guidance in Attachment A to Appendix B of the small scale modalities and procedures to establish project additionality and arrive at an appropriate and conservative baseline scenario.

There are two plausible alternatives available with project proponent to operate the Boiler System of the JST plant and meet the plant's steam requirements

Alternative 1- Implementation of the project activity in the existing Boiler System not undertaken as a CDM project activity;

The project activity is a set of energy efficiency improvement measures undertaken in the Boiler System with net CO_2 emission reductions due to reduced coal consumption in the boiler system. In this alternative, JST may implement the project activity without considering CDM. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline.

However this alternative had technological and prevailing practice barriers associated to its implementation. There had been no precedence to successful implementation of the project activity energy

efficiency measure. The project activity would otherwise not have been implemented due to the existence of the barrier(s) discussed below and is therefore not a part of the baseline.

Alternative 2- Continuation of current situation; No project activity energy efficiency measures adopted in the Boiler System;

Additionality test based on barriers to the proposed project activity

(a) The project type is not a regulatory/legal requirements

There are no legal bindings on JST to take up project activity.

(b) The project type is not a prevailing practice in the proposed area of implementation

JST requested Eastern India Textile Mills Association to conduct an energy management survey in similar textile industries in the Eastern Region – to study the common energy conservation practices adopted in 'Textile Industries'. A sample questionnaire[8] was sent to all the members of EITMA. Their responses were analyzed. The survey results concluded that the energy efficiency measures adopted by JST in the boiler system is not a common prevailing practice of Indian Textile Industries. Textile Industries in the eastern region have been operating their existing boilers without implementing innovative energy efficiency measures similar to the project activity. The Alternative 2 to the project activity has been the prevailing practice. The project activity feature developed in the JST boiler is not available in the new boilers, catering to industries operating at fluctuating steam demand.

The project activity is the first of its kind with a high replication potential.

The initiative adopted was a proactive step towards green house gas reductions. JST has received a letter of appreciation from renowned boiler manufacturing company with expertise in the field of energy management and conservation in India. This determines that the project activity is additional and unique.

The project activity has received due recognition for its thermal energy efficiency improvement at the national level and has been one of the factors due to which JST received the first prize - National Energy Conservation Award (NECA) 2002-2003 from Bureau of Energy Efficiency, Govt. of India.

The project activity is therefore an innovative retrofit measure *with replication potential in similar cases in India.* JST therefore plans to publish a paper in the 'Petroleum Conservation Research Association (PCRA)' Journal on these new technology developments to increase information sharing with Indian industries.

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[8] Reference: Enclosure V - Sample questionnaire of the 'Energy Management Survey' conducted by EITMA

(c) Technological Barrier

The project activity was engineered, designed and executed by JST's own engineering team. These measures were devised specifically for JST boiler system operations and are beyond conventional practices as stated above.

The project activity did not have any precedence since the operational risks like erratic variations in pressure and temperature of the furnace and improper synchronization of the ID fan draft with furnace air requirement for single bed operations were very likely. Operational risks due to erratic variations in pressure and temperature of furnace could damage the boiler lining or the entire boiler and could also cause formation of clinker within the furnace which would result in frequent boiler shut downs. Operational risks due to improper synchronization of the ID fan draft with furnace air requirement would cause a major drop in the boiler efficiency. The JST's engineering team was aware of these operational risks which would lead to the failure of the technology.

Technology failure would result in project investment losses, losses due to boiler replacement and the associated production losses. However the project proponent adopted the technology - a new design developed by JST's energy team, and took the risk of implementing the project activity by overcoming all the operational barriers due to implementation to reduce green house gas emissions.

A less technologically advanced Alternative 2 to the project activity, wherein the Boiler System was operated without adopting the project activity energy efficiency measure involves no risks related to performance uncertainty since it was operating smoothly and would have led to higher emissions; Further the Alternative 2 to the project activity is the prevailing practice in the Textile Sector and therefore does not face any barrier to implementation.

Before implementation of the project activity, JST considered all the barriers mentioned above. With goal of obtaining the proposed carbon financing for the project under the Clean Development Mechanism, JST's management took a corporate decision to overcome the barriers and invest

- in the CDM project activity through equity
- in additional transaction costs such as preparing documents, supporting CDM initiatives and developing and maintaining M&V protocol to fulfil CDM requirements.

It is ascertained that the project activity would not have occurred in the absence of the CDM simply because no sufficient financial, policy, or other incentives exist locally to foster its implementation of such thermal energy efficiency projects in India and without the proposed carbon financing for the project the JST would not have taken the investment risks in order to implement the project activity. In such an event, the project activity is not a baseline scenario and without the project activity the pre-project phase would have continued with no reduction in the coal consumption and its associated green house gas reductions. The CDM project activity is additional and will reduce 56,000 tonnes of CO_2 in 10 year of credit period (calculated as per the approved baseline and monitoring methodologies of the Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities) [details provided in section E].

B.4 Description of the project boundary for the project activity:

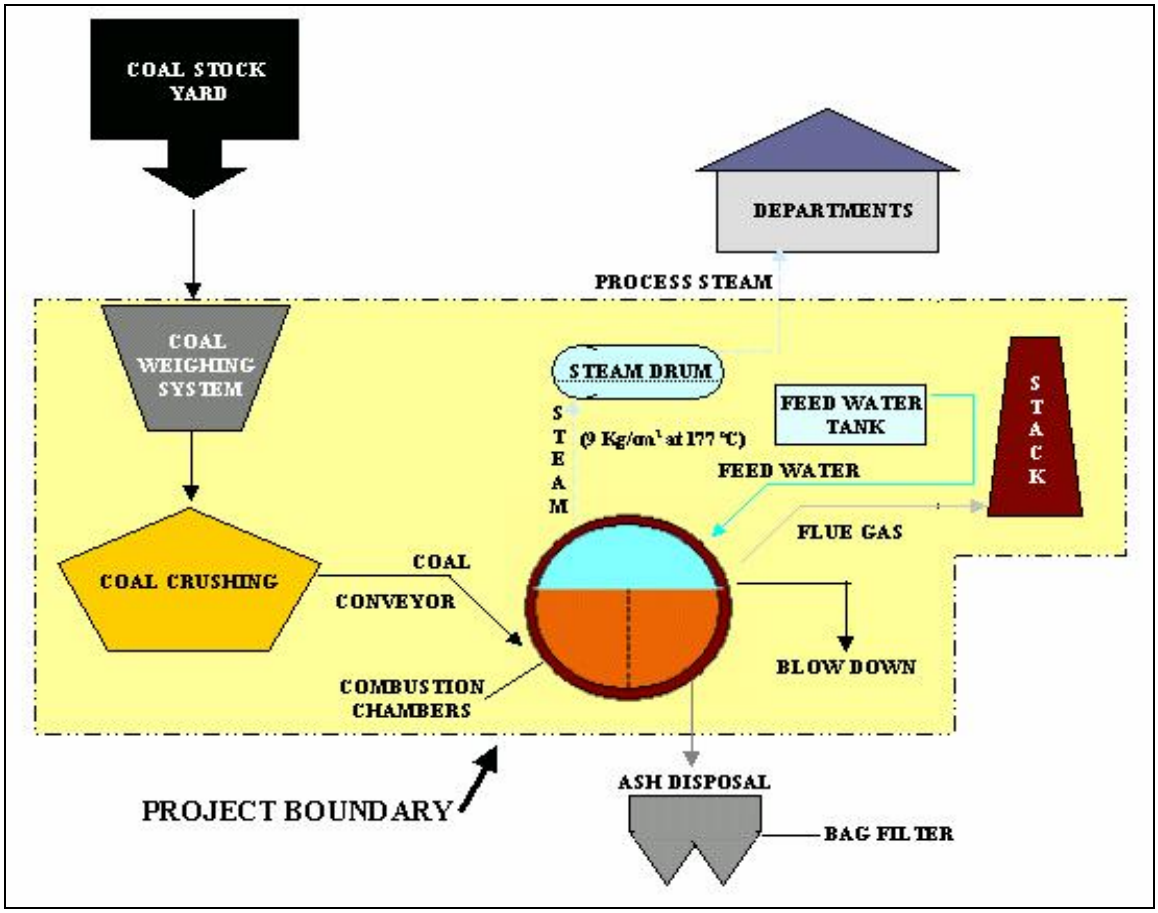
(Define the project boundary for the project activity using the guidance specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

The project boundary covers two terminal points - the point of fuel storage to the point of steam generated for use of the JST's manufacturing unit.

Thus, the project boundary includes

- coal-weighing system
- coal-crushing section
- the transport of the coal from coal yard to boiler through conveyor
- boiler with two combustion chambers and the steam discharge line
- stack for release of flue gases into the atmosphere

To illustrate the characteristics of the JST's steam generation system a flow diagram is presented below.



B.5 Details of the baseline and its development:

B.5.1 Specify the baseline for the proposed project activity using a methodology specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities:

The detailed computations of the energy and emission baseline are based on the approved simplified baseline methodologies specified in appendix B for project category Category IIB. For baseline analysis, data/information was collected from the previous records maintained by JST and used as under for total emission baseline.

The pre-project scenario of thermal energy losses in the boiler (thereafter referred to as energy baseline) and its equivalent CO_2 emissions (referred to as emission baseline) have been considered for baseline analysis and calculation of anthropogenic emissions by coal during steam generation in the base year.

The amount of emission reductions is determined with the help of energy baseline and the emission coefficient for coal. The carbon dioxide emissions [that is emission baseline] that would have occurred due to the technical losses of energy [that is energy baseline] in the absence of the project activity are determined over the entire crediting period. For each year the amount of reduced emissions results from the

difference between the above emission baseline due to technical losses that would occur in absence of the project activity and the actual emissions due to technical losses that have or are occurring after the implementation of the project activity.

Energy Baseline Estimation

The energy baseline for the base-year (2000-2001) is calculated as the monitored performance of the existing generating unit before the project activity. The future energy baselines values (in absence of project activity) are based on the energy baseline for the base-year calculated above.

The amount of thermal energy losses [Total input enthalpy – Total output enthalpy] from the JST boiler is a function of the boiler efficiency. It is assumed that there will be no change in the boiler efficiency factor. The boiler efficiency factor for the base-year has been used to predict the energy baseline of the crediting period.

Preventive maintenance is a key factor in ensuring proper boiler operation and maintaining the boiler efficiency. JST Boiler has a preventive maintenance schedule and manual ["Preventive Maintenance Manual – WI/Flax-Engg/06 and EHS&SAMSM"], that includes daily, weekly, monthly and annual maintenance activities, performance tests, inspections and proper documentation of both preventive and corrective actions taken, which is followed diligently. Therefore it is assumed that there will be no change in efficiency since the maintenance activities are diligently followed.

Steam demand is another factor, which affects the amount of thermal losses. However there are no future expansions foreseen (in the credit period) the steam demand would remain same as in the base-year and would not affect the boiler efficiency factor over the crediting period in absence of project activity.

Emission Baseline Estimation

The emissions depend on the type of fuel fired and the combustion efficiency. The provisions of the "Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories" **Category II B-** requires that emissions baseline should be in accordance with the following:

The emissions baseline is the energy baseline multiplied by an emission coefficient for the fuel used by the generating unit. IPCC default values for emission coefficients may be used. However to arrive at actual baseline emissions the actual *emission factor of the coal has been calculated based on the carbon content in the coal used and* describes the equivalent CO_2 emissions per heat unit (kcal) emitted by coal combustion. (0.00044293 kg CO_2/kcal). Details of the baseline emission calculations are provided in Enclosure I.

Leakage:

As per the Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories the project proponent is required to consider leakage if "the energy efficiency technology is equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

The energy efficiency technologies adopted in the project activity does not involve any equipment transfers from another activity or vice versa. Therefore there would be no net change of anthropogenic emissions by sources of greenhouse gases outside the project boundary.

B.5.2 Date of completing the final draft of this baseline section *(DD/MM/YYYY)*:

March 1, 2004

B.5.3 Name of person/entity determining the baseline: Indian Rayon and Industries Limited, Unit of Jayashree Textiles

(Please provide contact information and indicate if the person/entity is also a project participant listed in annex 1 of this document.)

C. Duration of the project activity and crediting period

C.1 Duration of the project activity:

C.1.1 Starting date of the project activity: September 2000

(For a definition of the term "starting date", please refer to the UNFCCC CDM web site).

C.1.2 Expected operational lifetime of the project activity: *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*

10 y

C.2 Choice of the crediting period and related information: *(Please underline the selected option (C.2.1 or C.2.2) and provide the necessary information for that option.)*

(Note that the crediting period may only start after the date of registration of the proposed activity as a CDM project activity. In exceptional cases, the starting date of the crediting period can be prior to the date of registration of the project activity as provided for in paragraphs 12 and 13 of decision 17/CP.7 and in any guidance by the Executive Board, available on the UNFCCC CDM web site.)

C.2.1 Renewable crediting period *(at most seven (7) years per crediting period)*

C.2.1.1 Starting date of the first crediting period *(DD/MM/YYYY)*: NA

C.2.1.2 Length of the first crediting period *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*:

Not Applicable

C.2.2 Fixed crediting period *(at most ten (10) years)*:

C.2.2.1 Starting date *(DD/MM/YYYY)*: April 2001.

C.2.2.2 Length (max 10 years): *(in years and months, e.g. two years and four months would be shown as: 2y-4m.10y) :*

10 y

D. Monitoring methodology and plan

(The monitoring plan shall incorporate a monitoring methodology specified for the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities and represent good monitoring practice appropriate to the type of project activity.

The monitoring plan shall also provide information on the collection and archiving of the data specified in appendix B of the simplified M&P for small-scale CDM project activities to:
- Estimate or measure emissions occurring within the project boundary;
- Determine the baseline, as applicable;
- Estimate leakage, where this needs to be considered.

Project participants shall implement the registered monitoring plan and provide data, in accordance with the plan, through their monitoring reports.

Operational entities will verify that the monitoring methodology and plan have been implemented correctly and check the information in accordance with the provisions on verification. This section shall provide a detailed description of the monitoring plan, including an identification of the data to be collected, its quality with regard to accuracy, comparability, completeness and validity, taking into consideration any guidance contained in the methodology, and archiving of the data collected.

Please note that monitoring data required for verification and issuance are to be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

An overall monitoring plan that monitors performance of the constituent project activities on a sample basis may be proposed for bundled project activities. If bundled project activities are registered with an overall monitoring plan, this monitoring plan shall be implemented and each verification/certification of the emission reductions achieved shall cover all of the bundled project activities.)

D.1 Name and reference of approved methodology applied to the project activity:

(Please refer to the UNFCCC CDM web site for the most recent version of the indicative list of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

(If a national or international monitoring standard has to be applied to monitor certain aspects of the project activity, please identify this standard and provide a reference to the source where a detailed description of the standard can be found.)

Title: Category II - Energy improvement projects – AMS-II.B - Supply side energy efficiency improvements - generation

Reference: 'Point 6 & 7 of Category II B ' as provided in Appendix B of the simplified modalities and procedures for small-scale CDM project activities – Indicative Simplified Baseline and Monitoring Methodologies for selected small-scale CDM project activity categories.

D.2 Justification of the choice of the methodology and why it is applicable to the project activity:

(Justify the choice of the monitoring methodology applicable to the project category as provided for in appendix B.)

As per the provisions of paragraph 14 of Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities [FCCC/CP/2002/7/Add.3, English, Page 21] the "Project participants may use the **simplified baseline and monitoring methodologies specified in appendix B** for their project category" if they met the applicability criteria of Small scale CDM project activity. Since the project activity is a small-scale CDM project of Category IIB category the monitoring methodology and plan has been developed in line with the guidance provided in point 6 & 7 of Category IIB of Appendix B.

Moreover project activity's carbon credits are based on the (coal) energy savings with reference to the steam load. GHG reductions are to be achieved by reducing coal consumption due to reduced technical losses from energy efficiency improvement measures. The methodology includes all the performance (GHG reduction) related parameters like 'total energy content of coal consumed', 'total energy content of steam generated', 'technical losses' and related 'energy savings' from the efficiency measures.

DESCRIPTION OF MONITORING METHODLOGY

The project revenue is based on the net energy savings from the project activity and is measured by calculating the energy content of the coal provided as input and the energy content of steam produced to meet the production requirements. The coal consumed by the boiler is measured at the bunker end before charging into the boiler. The monitoring and verification system mainly comprise of meters for temperature, pressure and quantity as far as the steam export to plant is concerned. Measurement of quantity of feed water used, its temperature and pressure are also included in the Monitoring Methodology and Plan in order to calculate the net enthalpy (output) and the technical losses in the project boundary after project activity implementation.

The instrumentation and control system for the boiler system is designed with adequate instruments to control and monitor the various operating parameters for safe and efficient operation of the boiler.

The instrumentation system comprises of microprocessor-based instruments with the best accuracy available. All instruments are calibrated and marked at regular intervals so that the accuracy of

measurement can be ensured all the time. The calibration frequency too is a part of the monitoring and verification parameters.

GHG Emissions Sources in the Project Boundary

Direct on-site emissions	This includes CO_2 emissions from coal combustion
The project activity has resulted in reduction of 'Direct on-site emissions'. The actual amount of emission reductions would be calculated based on the actual Monitoring Plan. The project activity does not lead to any additional CO2 emissions.	
Direct off-site emissions	This includes CO_2 emissions at the Thermal power plant caused due to electrical energy consumption
The project activity has resulted in reduction of 'Electrical energy consumption', which in turn has reduced in-direct on-site emissions'. The actual amount of emission reductions due to reduced electrical energy consumption has not been considered in the ER calculations for the project activity as the baseline methodology to be adopted would need to be in line with Category II C - Demand-side energy efficiency programmes for specific technologies. The project activity does not lead to any additional increase in electrical energy consumption or in-direct off-site emissions.	
In-direct on-site emissions	This includes CO_2 emissions from fuel combustion used for transportation of coal from Bankola Colliery to Ultadanga DD Line (190 km) by rail and further from Ultadanga to Rishra by Truck (25km)
The project activity has resulted in reduction of emissions due to reduced transportation due to reduction in coal consumption. However computation of the reduction of emissions due to transportation have not been considered. The project activity does not lead to any additional increase in in-direct off-site emissions.	
In-Direct off-site emissions	This includes emissions during the manufacturing process of parts, supplies and machinery required for project activity implementation (that is electromechanical equipment). But these emissions are outside the control of the project developer hence excluded from the baseline calculation.

Project parameters affecting emission reduction claims

The CDM mechanism stands on the quantification of emission reduction and keeping the track of the emissions reduced. The project activity reduces the carbon dioxide whereas an appropriate monitoring

system ensures this reduction is quantified and helps maintaining the required level. Also a monitoring system brings about the flaws in the system if any are identified and opens up the opportunities for improvement.

- Monitoring Approach

The general monitoring principles are based on:

- Frequency
- Reliability
- Registration and reporting

- Frequency of monitoring

As the emission reduction units from the project activity are determined by the amount of coal saved by reducing technical losses in the boiler system it becomes important for the project to monitor the coal consumption and steam production on real time basis.

- Reliability

The amount of emission reduction units is proportional to the net energy savings from the project activity. Thus the coal weighing system and meter readings for steam and feed water are the final values from project side. The reliability of the meter reading is verified by a competent Laboratory in West Bengal. Therefore the system ensures the fuel input, feed water input and steam output parameters used to calculate the emission reductions are highly reliable. Since the reliability of the monitoring system is governed by the accuracy of the measurement system and the quality of the equipment to produce the result all input and output parameter measuring instruments are calibrated once a year for ensuring reliability of the system.

- Reporting

The coal consumption, steam and feed water data are recorded manually on a daily basis and archived electronically. Monthly reports are prepared stating the steam generation, coal consumption, input and output enthalpies and GHG reductions.

D.3 Data to be monitored:

(The table below specifies the minimum information to be provided for monitored data. Please complete the table for the monitoring methodology chosen for the proposed project activity from the simplified monitoring methodologies for the applicable small-scale CDM project activity category contained in appendix B of the simplified M&P for small-scale CDM project activities.
Please note that for some project categories it may be necessary to monitor the implementation of the project activity and/or activity levels for the calculation of emission reductions achieved.

Please add rows or columns to the table below, as needed)

Considering the above, the details of total coal consumed and steam generated and other important project parameters to be monitored and verified are as under.

a) Thermal Energy Input

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D3(a) - 1.1	Mass	Quantity of Coal Used	Tons	Online Measurement	Daily	Total	Electronic	3 years after issuance of CERs	The data will be measured by the coal weighing system.The weighing system will be calibrated at frequency of one year. This data will be verified with the annual stock taking maintained through weighbridge system.
D3(a) - 1.2	Energy Content	Gross Calorific Value of Coal	Kcal/kg	Estimated	Weekly	Random Sample	Paper	3 years after issuance of CERs	The GCV Analysis is as per the Indian Standard Procedure.
D3(a) - 1.3	Concentration	Fixed Carbon Content	%	Estimated	Weekly	Random Sample	Paper	3 years after issuance	The Fixed Carbon Content Analysis in Coal is as per the Indian Standard Procedure.

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
		(C%) in Coal						of CERs	
D3(a) - 1.4	Energy	Heat energy input	Kcal	Calculated	Monthly	100%	Paper	3 years after issuance of CERs	-

b) Thermal Energy Output

ID number	Data type	Data variable	Data unit	Measured (m), calculated © or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?	For how long is archived data to be kept?	Comment
D3(b) – 2.1	Quantity	Steam Load	Tons	Online Measurement	Daily	100%	Paper	3 years after issuance of CERs	The data will be measured by Cumulative Steam meter at Steam Discharge Line.
D3(b) – 2.2	Pressure	Steam Pressure	Kg/cm2	Online Measurement	Daily	100%	Paper	3 years after issuance of CERs	The data will be monitored by meters at Steam Discharge Line
D3(b) – 2.3	Energy	Steam Enthalpy	Kcal	Calculated	Monthly	100%	Paper	3 years after issuance of CERs	

Footer Note*

D3(b) – 2.4	Temperature	Steam Temperature	^{o}C	Online Measurement	Daily	100%	Paper	3 years after issuance of CERs	This parameter has not been included in the Monitoring Plan since the Steam Temperature will be constant for a particular Steam Pressure which is included in the Monitoring Plan.

ID number	Data type	Data variable	Data unit	Measured (m), calculated © or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived?	For how long is archived data to be kept?	Comment
D3(b) – 2.5	Quantity	Feed Water Load	Tons	Online Measurement	Daily	100%	Paper	3 years after issuance of CERs	The data will be monitored by meters at Feed water Line
D3(b) – 2.6	Temperature	Feed water Temperature	oC	Online Measurement	Daily	100%	Paper	3 years after issuance of CERs	The data will be monitored by meters at Feed water Line
D3(b) – 2.7	Energy	Feed water Enthalpy	Kcal	Calculated	Monthly	100%	Paper	3 years after issuance of CERs	-
D3(b) – 2.8	Energy	Output Enthalpy	Kcal	Calculated	Monthly	100%	Paper	3 years after issuance of CERs	-

FootNote:

D3(b) – 2.9	Pressure	Feed water Pressure	Kg/cm2	Online Measurement	Daily	100%	Paper	3 years after issuance of CERs	This parameter has not been included in the Monitoring Plan since the Steam Temperature will be constant for a particular Steam Pressure which is included in the Monitoring Plan.

c) Thermal Energy Savings

ID number (Please use numbers to ease cross-referencing to table D.6)	Data type	Data variable	Data unit	Measured (m), calculated © or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D3(c) – 3.1	Energy	Technical Losses	kcal	Calculated	Monthly	100%	Paper	3 years after issuance of CERs	
D3(c) – 3.2	Efficiency	Boiler Efficiency	%	Calculated	Monthly			3 years after issuance of CERs	The Boiler Efficiency parameter would be verified by a third party on an annual basis

(d) For the transportation

ID number (Please use numbers to ease cross-referencing to table D.6)	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D3 (d) 1	Quantity	Number of Truck Trips		Measured	As and when truck trips take place.	100%	Paper	3 years	-

(e) For the Baseline Emissions

ID number (Please use numbers to ease cross-referencing to table D.6)	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D3(e) - 1.1	Mass	Quantity of Coal Used	Tons	Online Measurement	Daily	Total	Electronic	3 years after issuance of CERs	The data used for Baseline Calculations was measured by the coal weighing system for the Base-Year The weighing system is calibrated at frequency of one year. This data will be verified with the annual stock taking maintained through weighbridge system.
D3(e) - 1.2	Energy Content	Gross Calorific Value of Coal	Kcal/kg	Estimated Data available	Weekly	Random Sample	Paper	3 years after issuance of CERs	The GCV Analysis is as per the Indian Standard Procedure.
D3(e) - 1.3	Concentration	Fixed Carbon Content (C%)	%	Estimated Data available	Weekly	Random Sample	Paper	3 years after issuance of CERs	The Fixed Carbon Content Analysis in Coal is as per the Indian Standard Procedure.
D3(e) - 1.4	Energy	Heat energy input	Kcal	Calculated	Monthly	100%	Paper	3 years after issuance of CERs	-

ID number (Please use numbers to ease cross-referencing to table D.6)	Data type	Data variable	Data unit	Measured (m), calculated © or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D3(e) – 2.1	Quantity	Steam Demand	Tons	Estimated	Monthly/Yearly	100%	Paper	3 years after issuance of CERs	The data has been estimated for future years based on the proposed Steam demand .for the production requirements
D3(e) – 2.2	Pressure	Steam Pressure	Kg/cm2	Fixed as per the production requirement	Monthly/Yearly	100%	Paper	3 years after issuance of CERs	The data has been estimated for future years based on the past trend
D3(e) – 2.3	Energy	Steam Enthalpy	Kcal	Calculated	Monthly/Yearly	100%	Paper	3 years after issuance of CERs	
D3(e) – 2.4	Quantity	Feed Water Load	Tons	Estimated	Monthly/Yearly	100%	Paper	3 years after issuance of CERs	The data has been estimated for future years based on the proposed Steam demand and past trend records of feed water used to generate the per unit of steam
D3(e) – 2.5	**Temperature**	**Feed water Temperature**	*^{o}C*	*Estimated*	**Monthly/Yearly**	*100%*	*Paper*	*3 years after issuance of CERs*	The data has *been assumed for future years based on the past trend*
D3(e) – 2.6	**Energy**	**Feed water**	*Kcal*	*Calculated*	**Monthly**	*100%*	*Paper*	*3 years*	

ID number (Please use numbers to ease cross-referencing to table D.6)	Data type	Data variable	Data unit	Measured (m), calculated © or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
		Enthalpy						*after issuance of CERs*	
D3(e) – 2.7	**Energy**	**Output Enthalpy**	*Kcal*	*Calculated*	**Monthly**	*100%*	*Paper*	*3 years after issuance of CERs*	

ID number (Please use numbers to ease cross-referencing to table D.6)	Data type	Data variable	Data unit	Measured (m), calculated © or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D3(e) – 2.8	**Energy**	**Technical Losses**	*kcal*	*Calculated*	**Monthly**	*100%*	*Paper*	*3 years after issuance of CERs*	
D3(e) – 2.9	**Efficiency**	**Boiler Efficiency**	*%*	*Calculated*				*3 years after issuance of CERs*	The Boiler Efficiency has been calculated based on the past data. Since there isn't much of steam variations and the preventive & corrective maintenance schedules are in place before the project activity implementation we assume an average Boiler Efficiency for Baseline Calculations.

The monitoring results will allow for the verification of the CERs reasonably attributed to project activities and ensure optimal project performance.

D.4 Name of person/entity determining the monitoring methodology:

(Please provide contact information and indicate if the person/entity is also a project participant listed in annex 1 of this document.)

Indian Rayon and Industries Limited, Unit of Jayashree Textiles

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

(In E.1.1 please provide the formula used to calculate the GHG emission reductions by sources in accordance with the applicable project category of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.

In case the applicable project category from appendix B does not indicate a specific formula to calculate the GHG emission reductions by sources, please complete E.1.2 below.)

E.1.1 Selected formulae as provided in appendix B:

(Describe the calculation of GHG emission reductions in accordance with the formula specified for the applicable project category of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

Not Applicable.

E.1.2 Description of formulae when not provided in appendix B:

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

There is no additional increase in energy use due to the project activity within the project boundary and the therefore the project activity itself leads to zero net GHG on-site emissions.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

There is no leakage activity, which contributes to the GHG emissions outside the project boundary.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the project activity emissions:

Net CO_2 emissions by project activity is zero

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities: *(for each gas, source, formulea/algorithm, emissions in units of CO_2 equivalent)*

The pre-project scenario of technical energy losses in the boiler and its equivalent CO_2 emissions has been considered for baseline analysis and calculation of anthropogenic emissions by coal during steam generation.

- **ENERGY BASELINE CALCULATIONS**

The energy baseline for the base year is calculated as the technical losses based on the monitored coal consumption and steam generation patterns of the existing generating unit before the implementation of the project activity. The future energy baselines (in absence of project activity) are calculated based on the boiler efficiency factor of the base year.

Formulae used for estimation of the technical losses before project activity implementation, which represents the 'energy baseline' for the base year for the project activity are as under.

$$TL_{(Base.year(2000-2001))} = E_{input} - E_{output} \quad \ldots\ldots 1.$$

where

$TL_{(Base\ year(2000\text{-}2001))}$=Technical Losses before the project activity was implemented

E_{input}= Enthalpy input provided by coal (The values are based on the coal consumed and Gross Calorific Value of coal. These parameters are monitored values)

$$E_{output} = E_{steam} - E_{feedwater}$$

E_{output}= Net Enthalpy output provided to generate steam

E_{steam}= Total Enthalpy of steam (The values are based on the steam generated at the required temperature and pressure)

E_{steam}= Total Enthalpy of feed water

Formulae used for estimation of the technical losses before project activity implementation, which represents the 'energy baseline' for the crediting years for the project activity are as under.

$$TL_{Baseline.Credit.Year1.....n(Future)} = \left[\left(\frac{E_{Output.1.....n(Future)}}{BE^{1}} \right) . \otimes 100.. \right] - E_{Output1.....n(Future)} \quad \ldots\ldots 2$$

where

$TL_{(Baseline\text{-}Credit\ year\ 1\ \ldots\ldots n)}$=Technical Losses for the credit period 1….. n years in absence of the project activity.

BE^1 = Boiler Efficiency calculated in the base year before implementation of the project activity

$$E_{output} = E_{steam} - E_{feedwater}$$

E_{output}= Net Enthalpy output provided to generate steam (The values are based on the steam demand estimates)

E_{steam} = Total Enthalpy of steam (The values are based on the steam generated/to be generated at the required temperature and pressure. These values are derived on the basis of the production requirements)

$E_{feedwater}$ = Total Enthalpy of feed water (The values are based on the feed water to be used to generate steam and the past temperature of the feed water for respective months.)

- **EMISSION BASELINE CALCULATIONS**

The Emission Baseline for the base year is calculated by multiplying the actual technical losses before project activity implementation (as per equation 1) by the actual Emission Coefficient (EC) . The future emission baselines (in absence of project activity) are calculated conservatively taking into consideration the technical losses (as per equation 2.)

$$E_{Base.Year(2000-2001)} = TL_{Base.Year(2000-2001)} \otimes EC_{Actual.E.F.} \quad \text{.....3}$$

$$E_{Baseline.Credit.year1.....n} = TL_{Baseline.Credit.year1.....n} \otimes EC_{Actual.E.F.} \quad \text{.....4}$$

where

$E_{Baseyear\ (2000\text{-}2001)}$ = Emissions due to Technical losses before project activity implementation

$E_{Baseline.Credit\ year\ 1.....n}$ = Proposed emissions in future credit period due to Technical losses in absence of project activity implementation

- **Emissions in the project boundary after project activity implementation**

Formulae used for estimation of the technical losses after project activity implementation, which represents the 'energy credit period line' for the actual years of the project activity implemented are as under.

$$TL_{Credit.year1....n(actual)} = E_{input(actual)} - E_{output(actual)} \quad \text{.....5}$$

where

$TL_{(\text{Credit year 1 .....n})}$=Technical Losses for the credit period 1….. n years after the implementation of the energy efficiency steps of the project activity

E_{input}= Enthalpy input provided by coal (The values are based on the actual data of coal consumed available and Gross Calorific Value of coal after implementation of each of the energy efficiency steps of the project activity.)

$$E_{output} = E_{steam} - E_{feedwater}$$

E_{output}= Net Enthalpy output provided to generate steam

E_{steam}= Total Enthalpy of steam (The values are based on the actual data of steam generated available at the required temperature and pressure.)

$E_{feedwater}$= Total Enthalpy of feed water (The values are based on the actual data of feed water used to generate steam)

Formulae used for estimation of the technical losses after project activity implementation, which represents the 'energy credit period line' for the future crediting years for the project activity are as under.

$$TL_{Credit.Year1.....n(Future)} = \left[\left(\frac{E_{Output.1.....n(Future)}}{BE^2} \right) . \otimes 100.. \right] - E_{Output1.....n(Future)} \quad \text{.....6}$$

where

$TL_{(\text{Credit year 1 .....n})}$=Technical Losses for the credit period 1….. n years after the implementation of the energy efficiency steps of the project activity

BE^2 = Boiler Efficiency calculated in the base year before implementation of the project activity

$$E_{output} = E_{steam} - E_{feedwater}$$

E_{output}= Net Enthalpy output provided to generate steam

E_{steam}= Total Enthalpy of steam (The future values are derived on the basis graph 2 of the steam production requirements at the required temperature and pressure)

$E_{feedwater}$= Total Enthalpy of feed water (The values are based on the feed water to be used to generate steam and the past temperature of the feed water for respective months.)

- **EMISSION CALCULATIONS**

The emissions for the credit years after project implementation are calculated by multiplying the actual technical losses after project activity implementation (as per equation 3) by the Emission Coefficient as per the IPCC default value. The future emissions (after project implementation) are calculated conservatively taking into consideration the technical losses (as per equation 4.)

Formulae used for estimation of the Emissions after project activity implementation, which represents the ' emission credit period line' for the crediting years for the project activity are as under.

$$E_{Credit.Year1.....n(actual)} = TL_{Credit.year.1.....n(actual)} \otimes EC_{Actual.E.F.} \quad \text{.....7}$$

$$E_{Credit.Year1.....n(Future)} = TL_{Credit.year.1.....n(Future)} \otimes EC_{Actual.E.F.} \quad \text{.....8}$$

where

$E_{\text{Credit Year.1.....n (actual)}}$ = Actual Emissions due to Technical losses after project activity implementation

$E_{\text{Credit Year 1.....n (future)}}$ = Proposed emissions in future credit period due to Technical losses in after project activity implementation

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

- **Emission Reduction by project activity**

$$ER_{Credit.year1....n} = E_{Baseline.Credit.year1.....n} - \left(E_{Credit.Year.1.....n(actual)} \oplus E_{Credit.Year.1.....n(future)}\right) \text{.....9}$$

where

$ER_{\text{(Credit year 1 .....n)}}$ = Emission reduction over the credit period 1.....n years by project activity (tones/year)

E.2 Table providing values obtained when applying formulae above:

Please refer to Enclosure – I, II and III

F. Environmental impacts

F.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity: *(if applicable, please provide a short summary and attach documentation)*

The project activity has only positive environmental impacts – like reduction in coal consumption and its associated emissions, which include carbon dioxide, Sulphur oxides, nitrogen oxides, Suspended Particulate Matter and Respirable Suspended Particulate Matter. It has also reduced the adverse air pollution impacts related to transportation of coal (from Ultadanga to Rishra) and coal mining that would have been required to meet the additional requirement of the boiler. The project activity has also resulted in annual electrical savings. These aspects contribute to the regional and global benefits.

The project activity had no negative environmental impacts from the implementation of the project activity.

The Host party regulatory authority (West Bengal Pollution Control Board) does not require JST to conduct an 'Environment Impact Assessment' as per the statutory requirements for the project activity due to its small scale.

G. Stakeholders comments

G.1 Brief description of the process by which comments by local stakeholders have been invited and compiled:

Identification of Stakeholders

Since the project activity implementation is a set of modifications in the boiler system and is relatively small scale it has no significant negative environmental impacts to noise, air or water pollution outside the facilities, therefore comments from the local population is not necessary. However some of the stakeholders listed below had been identified. They include government and non-government parties, which have been involved in the project activity at various stages, are as under. JST communicated all relevant information to the stakeholders to get the necessary clearances/approval and comments.

- JST Employees
- West Bengal Pollution Control Board
- Renowned Boiler Manufacturing Company
- Energy Auditor
- PCRA

G.2 Summary of the comments received:

Stakeholders Involvement

JST Employees:

One of the most important stakeholders and beneficiaries of the project activity are the workers of JST. The project activity has excellent local environmental impacts and the JST workers benefit from improved environmental surroundings. They appreciate JST management's contribution towards energy conservation and reducing green house gases, which contribute to global warming.

West Bengal Pollution Control Board:

As mentioned above the West Bengal Pollution Control Board (WBPCB) and Environment Department of Government of West Bengal do not require JST to submit an Environmental Impact Assessment for the project activity. However JST is required to send a communication to the pollution control authorities above any major modification in their facilities. JST has provided the WBPCB authorities with the project activity details for their information. No comments have been received from them.

Energy Auditor:

One of the provisions in the Energy Conservation Act, 2003 regarding Designated Consumers provide for the following:

- directing designated consumers and energy intensive industries specified in the Schedule to get an energy audit conducted by an accredited energy auditor in the specified manner and intervals of time. Further only large energy users (units having connected load of 5 MW or energy consumption of 30, 000 tonnes of oil equivalent per year) would be so notified.[9]

JST meets the statutory requirements as mentioned above. The statutory auditor has reported the energy efficiency improvements in the Boiler System due to implementation of the project activity. The energy auditor has appreciated the energy conservation measures adopted by JST.

PCRA

Petroleum Conservation Research Association (PCRA) is one most renowned organisations promoting energy conservation. JST communicated their success to PCRA and are in the process of submitting a paper to them for publication in their PCRA journal to share the knowledge acquired through research and development in the energy conservation with the Indian industries.

Boiler manufacturer

The boiler manufacturing company is a leading, global company specializing in the areas of generation and conservation of energy and preservation of the environment. With an annual turnover of US $200 million, the company provides integrated services and equipment in Boilers and Heaters, Captive Power, Cooling,

[9] Source: http://www.bee-india.com/about_bee/action_plan/05_ta1.htm

Water and Waste Solutions, Enviro and Chemicals. It has joint ventures with Babcock & Wilcox and Energy Performance Services. The company has a global reach, with 11 overseas offices and a domestic network of 12 sales & service offices. JST has received a letter of appreciation from the boiler manufacturing company on the Boiler Efficiency Project.

As per UNFCCC requirement the Project Design Document will be published at the validator's/UNFCCC web site for public comments.

G.3 Report on how due account was taken of any comments received:

The project activity has received positive comments from the stakeholders. The CDM-PDD will be posted on the UNFCCC or validator's web site for public viewing and comments.

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

(Please repeat table as needed)

Organization:	Indian Rayon and Industries Limited, Unit of Jayashree Textiles
Street/P.O.Box:	Rishra, P.O. Prabasnagar 712249
Building:	-
City:	
State/Region:	West Bengal
Postcode/ZIP:	712249
Country:	India
Telephone:	91-33-26721146
FAX:	91-33-26722626
E-Mail:	-
URL:	-
Represented by:	
Title:	Mr.
Salutation:	-
Last Name:	Goenka
Middle Name:	K.
First Name:	V.
Department:	Vice President – Finance
Mobile:	-
Direct FAX:	-
Direct tel:	91-33-26723042
Personal E-Mail:	vgoenka@adityabirla.com

Organization:	Climate Change Cell, Ministry of Environment & Forest, Government of India
Street/P.O.Box:	Lodhi Road
Building:	Paryavaran Bhawan, CGO Complex
City:	New Delhi
State/Region:	New Delhi
Postcode/ZIP:	110003
Country:	India
Telephone:	91-11-24362252
FAX:	91-11- 24363577
E-Mail:	-
URL:	-
Represented by:	
Title:	Mr.
Salutation:	-
Last Name:	Sethi
Middle Name:	K.
First Name:	R.
Department:	Director – Climate Change
Mobile:	-
Direct FAX:	-
Direct tel:	-
Personal E-Mail:	rksethi@menf.delhi.nic.in

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding for this project.

Enclosure IV: Abbreviations

%	Percentage
BE	Baseline Emissions
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO_2	Carbon Di Oxide
EHS	Environment, Health and Safety
GHG	Green House Gases
Gwh	Giga Watt Hour
GWP	Global Warming Potential
HTHP	High Temperature High Pressure Machine
ID Fan	Induced Draft Fan
INR	Indian Rupees
IPCC	Intergovernmental Panel on Climate Change
JST	Jayashree Textiles
kcal	Kilo Calorie
kg	Kilo Gram
kg CO2equ/kWh	Kilo Gram Carbon Di Oxide equivalent per Kilo Watt Hour
kg/cm^2	Kilo Gram per square centimeter
km	Kilo Meter
kw	Kilo Watt
M & P	Modalities and Procedures
MW	Mega Watt
^oC	Degree Centigrade
OECD	Organisation for Economic Co-operation and Development
PCRA	Petroleum Conservation Research Association
PDD	Project Design Document
QMS	Quality Management System
RSPM	Respirable Suspended Particulate Matter
SPCB	State Pollution Control Board
SPM	Suspended Particulate Matter
tCO_2	Tonnes of Carbon Di Oxide
ton/hr	Ton per Hour
TPH	Tons per Hour
UNFCCC	United Nations Framework Convention on Climate Change
WBPCB	West Bengal Pollution Control Board

Enclosure V: List of References

Sl..No.	Particulars of the references
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change
2.	Website of United Nations Framework Convention on Climate Change (UNFCCC), **http://unfccc.int**
3.	UNFCCC Decision 17/CP.7 : Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol.
4.	Clean Development Mechanism Simplified Project Design Document For Small Scale Project Activities (SSC-PDD) *[Version 01 : 21 January, 2003],* UNFCCC
5.	Annex B to Attachment 3 Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories *[Version 02: 2 December, 2003],* UNFCCC
6.	Stakeholders Comments, (2003), Indian Rayon & Industries Limited, Kolkata
7.	Monitoring Data Book, (2000,2002,2003), Indian Rayon & Industries Limited, Kolkata

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A.

Enclosure VI: Sample questionnaire of the 'Energy Management Survey' conducted by EITMA

Name of the Industry	
Street Address (include web address, if any)	
Contact person	
Telephone / fax	
Main activities	

Energy Management Survey

1. Have you installed any 'Variable Frequency Drives' in Fans/Pumps of your Humidification Towers to cater to the seasonal variations? YES/NO
2. If YES Please mention the date of Installation:
3. If NO, would you be interested to know more about the technology? YES/NO
4. Have you adopted any other device/equipment to cater to the seasonal variation in operation of Fans and Pumps? YES/NO
5. If YES Please mention the measure:

1. Have you adopted any 'Bed Modulation System' in your boilers? YES/NO
2. If NO would you be interested to know more about the technology? YES/NO
3. Have you implemented any 'Furnace Draft Control System' in your boilers? YES/NO
4. If NO would you be interested to know more about the technology? YES/NO
5. Have you implemented any 'Heat Recovery System' in HTHP Machines? YES/NO
6. If NO would you be interested to know more about the technology? YES/NO

Signature:	Date:
Thank you, for your Co-operation.	