CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

>>

Demand-side energy efficiency programme in the 'Humidification Towers' of Jaya Shree Textiles

A.2. Description of the small-scale project activity:

>>

Jayashree Textiles Division (JST) is a unit of Indian Rayon & Industries Limited (IR&IL) in West Bengal, India. As a corporate citizen of India, Jayashree Textiles Divisions is keenly aware of its obligations towards the Indian economy. The energy efficiency improvement initiative is one of such derivatives towards this mission accomplishment.

The project activity, an energy efficiency programme is an application of the technology of the variable frequency drive in the linen manufacturing process and was devised by the Energy Management Team of JST through an in-house study.

The purpose of the project activity is to improve the energy efficiency levels in the 'Humidification Towers' of the Worsted Mill and Flax Division of JST. These measures were devised to reduce electrical energy consumption of the 'electrical drives', which provide forced drafts in the Humidification Towers. This energy conservation programme would reduce the demand for an equivalent generation of electrical energy on the grid mix and result in indirect CO2 emission reductions, at the grid power plants.

India's power generating system (grid) consumes the major share of finite fossil resources and is one of the most important sources of air pollution. Electricity generated from solid fossil fuels is characterized by the emissions of CO2 SOx and NOx per unit of electricity, which in turn cause an increased risk to the health of the exposed population.

The project activity, by reducing its power demand contributes to the reduction in the negative environmental, social and economic impacts associated to electricity generation as noted above.

The main social, environmental and economic benefits of this project activity may therefore be summarized as:

- Reduction in electrical energy losses - Energy conservation
- Indirect Reduction of GHG / CO_2 emissions at the coal fired power plant
- Conservation of coal, a non-renewable natural resource
- Making coal available for other important applications
- Reduction in CO_2 emissions;

- Reductions of SO_x and NO_x emissions at coal fired power stations associated with reduced coal consumption; air quality improvement.
- Some reduction in adverse coal mining impacts (dust and acid mine drainage)
- Some reduction in adverse coal transport impacts,
  Hence an improvement in air quality and in the overall quality of the environment
  Technology enhancement

A.3. Project participants:

>>

Name of the Party involved ((host) indicates a host party)	Private and/or public entity(ies) Project participants (as applicable)	Role of the participant	Contact person (Details are provided in Annex-I)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Indian Rayon & Industries Limited – Unit Jaya Shree Textiles	Private sector company	Project developer cum sponsor	Mr. V. K. Goenka, Vice President - Finance	Yes
Ministry of Environment and Forests (MoEF), Government of India	Public sector company	Designated National Authority of India- the Host Country	Mr. R.K. Sethi, Director Climate Change	No

A.4. Technical description of the small-scale project activity:

>>

A.4.1. Location of the small-scale project activity:

>>

A.4.1.1. Host Party(ies):

>> India

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

>> West Bengal

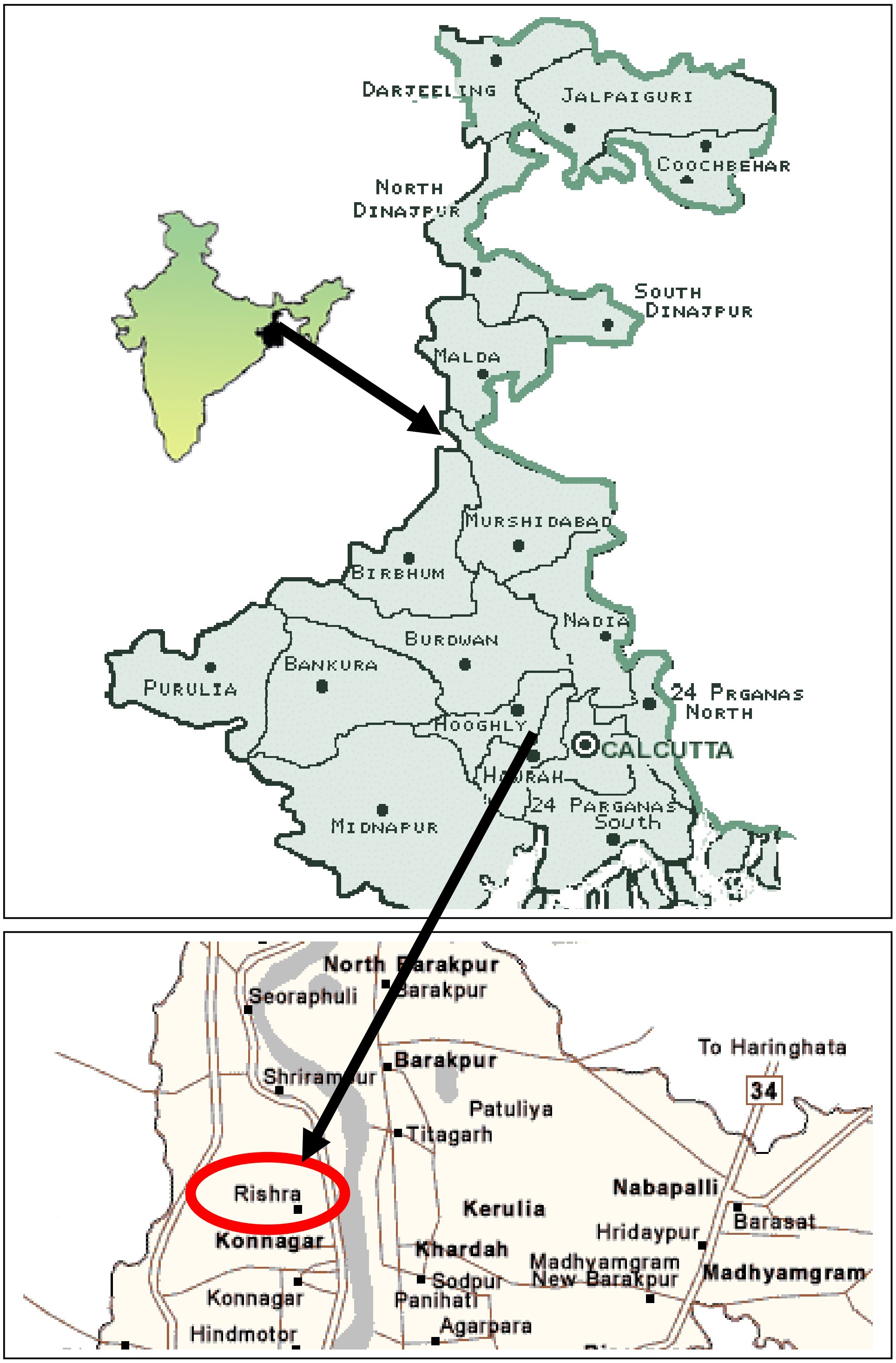
A.4.1.3. City/Town/Community etc:

>> Rishra

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

>>

Project activity is implemented on the "Electrical Drives" located in the Humidification Towers of Worsted Mill and the Flax Spinning Department of Jayshree Textiles (JST) Division, Rishra, West Bengal India. The geographic location has been indicated in the map given below.



A.4.2. Type and category(ies) and technology of the small-scale project activity:

>>

Main category - Type II

Sub Category - C

As per the provisions of paragraph 1 of Type II.C., 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 activities categories Version 05:25 February 2005 (hereafter referred to as Appendix B), Category Type IIC "comprises programmes that encourage the adoption of energy-efficient equipment, lamps, ballasts, refrigerators, motors, fans, air conditioners, appliances, etc. at many sites. These technologies may replace existing equipment or be installed at new sites. The aggregate energy savings by a single project may not exceed the equivalent of 15 GWh per year."

The project activity is an energy efficiency programme comprises of installation of Variable Frequency Drives (VFDs) at the motor end of electrical drives so as to increase the energy-efficiency of the motors in the Humidification Towers. Annual average energy consumption reduction due to the project activity is of the tune of 3.48 GWh/year from 2003-2004 (which is below the required energy reduction cap of 15GWh/year).

Therefore the project activity meets the applicability criteria of small-scale CDM project activity category under Type-II: Energy efficiency improvement projects (C. Demand-side energy efficiency programmes for specific technologies) of the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories.

Technology Applied:

The details of the technology and its application in the project activity are detailed below:

The Variable Frequency Drive (VFD) is installed to the rotor of the electric drives to operate them at variable speed. Since the rotor can operate at any speed below its maximum capacity, the output of the motor can be made to vary by controlling the rotor speed by a VFD installation (instead of the throttling or damper control). A variable frequency drive can control two main elements of a 3-phase induction motor: speed and torque. This is adjusted by changing the frequency applied to the motor. If the required output of the rotor is lower than the present output capacity, the frequency of the rotor may be regulated below full operational capacity by the variable frequency drive. With reduction in frequency of the rotor the power input reduces proportionately.

Application of VFD Technology at the Humidification Towers

JST Departments' humidification is maintained by regulating the humidification and temperature of the air in flow to the departments through 'Humidification Towers'.

In pre - project scenario the electrical drives in the Humidification Towers were operating at maximum operational frequency of 50Hz (ie. at grid frequency) throughout the year and the air flow inlet was regulated by Damper controls

The flow rate of the inlet supply air is a function of the required departmental heat load, as per the production's temperature requirements. The required heat load is a function of the number of machines operating in department, the total manpower working and the seasonal temperatures outside the department. The number of machines operating and the total manpower are nearly constant for the entire year. However due to the seasonal temperature variations, the heat load requirements would vary and the flow rate of the inlet supply air would need to be altered accordingly. Since the load to be exerted on the electrical drives depends on the required flow rate of the inlet supply air, with a reduced airflow requirement for some of the seasons when atmospheric temperatures are lower, the electrical drives would operate at part load.

To maintain the required departmental heat load (department temperature) the motor output requirements (ie. flow rate of the inlet supply air) in different seasons would be different and could be varied by altering the input frequency of the motor to the desired level through variable frequency drives. JST conducted an in-house observation study to establish the optimum operating frequency of the motors for all operational months with varying air flow requirement. The details of the monthly recommendations of the operational frequencies are given below in Table A-I. The recommended frequencies for the months July to April given below are below full operational capacity of the motors and are regulated by the variable frequency drives.

Table#A-1

MONTHS	% DECREASE IN AIR FLOW	RECOMMENDED FREQUENCY IN Hz
OCT, NOV, DEC, JAN	33.33	35 Hz

FEB, MARCH, SEPT	24.8	40 Hz
APRIL, AUGUST, JULY	11	45 Hz
MAY, JUNE	0	50 Hz

These seasonal variations in the operating frequencies of the motors would result in reduced power consumption. JST team further monitored the electricity consumption of all the equipments with VFD's at each of the recommended frequencies (optimum operating frequency) for various seasons as determined in the first phase of the study and at maximum frequency of 50Hz to determine the reductions in the power consumption over the study period. The estimated electricity savings over the entire crediting period is provided in Enclosure A

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

>>

The project activity conserves 3.48 GWh of electrical energy per annum and consequently yields the replacement of a conventional energy equivalent of 30.27 GWh for a period of 10 years in West Bengal. Without the project activity, the same energy load would have been taken up thermal power plants comprising the West Bengal grid mix and emission of CO_2 would have occurred due to combustion of fuels. Thus, in the project scenario, CO_2 emission reduction of 29,511 tonnes in 10 years, are realised.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

>>

Years	Annual estimation of emissions in tonnes of CO_2 e
2000-2001	613.49
2001-2002	2178.03
2002-2003	2912.85
2003-2004	3393.31
2004-2005	3393.31
2005-2006	3393.31
2006-2007	3393.31
2007-2008	3393.31
2008-2009	3393.31
2009-2010	3393.31
Total estimated reductions (tonnes of CO_2 e)	29511
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	3393.31

A.4.4. Public funding of the small-scale project activity:

>>

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

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

>>

The project activity is not a de bundled 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 Type IIC project category and deals with the same technology/measure at the factory premise.

SECTION B. Application of a baseline methodology:

B.1. Title and reference of the approved baseline methodology applied to the small-scale project activity:

>>

Title: ENERGY EFFICIENCY IMPROVEMENT PROJECTS – Demand-side energy efficiency programmes for specific technologies

Reference: Appendix B[1] 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, Version 05: 25 February 2005

Approach: Existing actual or historical **emissions,** as applicable**;**

Reference: Paragraph 48 of decision -17 /CP –7 of Modalities and procedures for CDM as defined in article 12 of Kyoto Protocol (FCCC/CP/2001/13/Add.2)

B.2 Project category applicable to the small-scale project activity:

>>

As per the provisions of paragraph 14 of Annex II: Simplified modalities and procedures for small scale clean development mechanism 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[2] : Detailed justifications related to applicability are given below in bullet points (a), (b) and (c)

(a) Meet the eligibility criteria for small-scale CDM project activities set out in paragraph 6(c) of decision 17/CP.7[3] which is;

---

[1]Reference : http://cdm.unfccc.int/UserManagement/FileStorage/ssc_ii_c.pdf

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

[3] [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;

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

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

The project activity includes installation of variable frequency drives to improve the energy efficiency of some equipments operating in the Humidification Towers and reduces electrical energy consumption on the demand side. The annual average electrical energy reduction per annum is to be of the order of 3.48 GWh, which is within the upper cap of the small scale CDM project activity requirement

(b) Conform to one of the project categories in appendix B to this annex;

The project activity conforms to "Type II C" project category in appendix B. The justification of the same has been provided in Section A.4.2.

(c) Not be a debundled component of a larger project activity, as determined through appendix C to this annex.

The project activity is not a debundled component of a larger project activity as determined through appendix C of Simplified Modalities and Procedures for Small Scale CDM Project Activities [FCCC/CP/2002/7/Add.3, English, Page 21]. The justification of same has been provided in Section A.4.5.

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

Further the project activity 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 (paragraph 3, 4 and 5) specified in Type II.C., Appendix B has been used for determination of the energy baseline and the emission baseline of the project activity.

The guidance provided in Type II.C., Appendix B suggests that if the energy displaced is electricity, the energy baseline should be estimated as per the formulae given in paragraph 4. The annual energy baseline is calculated based on the number of devices of the group of devices replaced, the power of the devices of the group of devices replaced, the average annual operating hours of the devices of the group of devices replaced and the average technical distribution losses for the grid serving the locations where the devices are installed. The energy baseline is further multiplied by an emission coefficient (measured in kg CO_2equ/kWh) for the electricity displaced calculated in accordance with provisions of paragraphs 6 and 7 for category I.D. projects, to determine the baseline emissions.

The project activity displaces the electricity in the baseline scenario[4] and the quantum of displacement would be the difference in the energy consumption that occurred in the baseline scenario (*i.e.* pre-project activity) and project scenario (*i.e.* post project activity). The most appropriate and conservative method of estimating the electricity consumption in the baseline scenario would therefore be based on the number of motors in the Humidification Towers which would have VFD installations, the power of the motors in the group, the average annual operating hours of the motors and the average technical distribution losses for the grid serving the motor operations. This method of estimating the energy baseline to calculate the baseline emissions for the project activity is in line with the guidance laid in Appendix B and is both transparent and conservative. Further guidance provided in order to calculate the emission coefficient of the grid too has been found to be appropriate, since the data necessary for the same is available. This methodology has therefore been adopted.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

>>

The Appendix B requires the project activity to determine its additionality as per the guidance provided in Attachment A to Appendix B.

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. These plausible options were further analysed as per the guidance in Attachment A to Appendix B of the small scale modalities and procedures to establish project additionality and determine an appropriate and conservative baseline scenario.

The two plausible alternatives available with JST were

Alternative 1**-** Continuation of current situation; No project activity energy efficiency measure adopted in the Humidification;

In the alternative-1 JST would continue with the existing damper control system used for varying the flow rate of supply air required by the process departments. This alternative is in compliance with all applicable legal and regulatory requirements .This alternative is a prevailing practice in the textile industry sector and has been operative at JST since plant inception. There is no investment, technological or other barriers associated to its implementation and may be the baseline.

---

[4] The most appropriate baseline scenario of the project activity is the ‘Continuation of the current situation or pre-project scenario; No project activity energy efficiency measures adopted in the Humidification Towers’

Alternative 2- Implementation of the project activity at the Humidification Towers as a CDM project activity;

The project activity is an energy efficiency improvement measure with net CO_2 emission reductions due reduced electricity consumption patterns in the Humidification Towers. This alternative is in compliance with all applicable legal and regulatory requirements but there is no legal binding on JST to take up the project activity.

The Energy Department, Government of West Bengal encourages energy efficiency improvements but does not require industries to reduce their energy consumption to a prescribed standard. Therefore the emission reductions attained through project activity implementation are not guided by any legal mandate or state/national policies but are undertaken voluntarily by JST.

Further this alternative had technological and prevailing practice barriers associated to its implementation. Therefore the project activity installations were not built in as a part of the manufacturers' design. Neither was there any 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.

(a) Additionality test based on barriers to the proposed project activity

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

JST requested Eastern India Textile Mills Association (EITMA) 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[5] was sent to all the members of EITMA. Their responses were analyzed. The survey results concluded that the project activity energy efficiency measure is not a common /prevailing practice. The Alternative 1 has been the prevailing practice which leads to higher emissions.

The project activity has not been undertaken by the textile industries because of financial barriers that make capital availability for such technologically advanced energy efficiency project options with no precedence, difficult.

JST was one of the first textile industries in the Eastern Region to identify the areas where the VFD technology could be adopted and electrical energy consumption and its associated emissions could be

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

reduced. The project activity initiative adopted by JST was a proactive step towards green house gas reductions.

JST has received letters of appreciation from renowned organisational set-ups like EITMA in the field of energy management and conservation in India.

(b) Technological Barriers for the project activity:

In India the two conventional methods adopted for varying the flow rate of supply air are by damper control or by inlet or discharge guiding vanes. Both these methods are conventional and have proven track record in terms of risk free airflow control. Further, these methods are comparatively very low cost methods. But, these techniques ultimately result into deviation in the duty points of air blowers from rated duty points and thereby lead to substantial losses of electrical energy. The damper control system (Alternative 1) is the status quo at JST and is less technologically advanced with no risks related to performance uncertainties but leads to higher emissions.

The project activity (Alternative 2) leads to lower emissions, has a high replication potential but a low market share due to performance uncertainties. The present application of variable frequency drive is the new technology in India and relatively incurs higher cost. The application of this technology calls for sophistication of operational practices and skilled manpower for maintenance. The major barriers in implementation of project activity can be described as follows.

(i) The temperature of drive and control panel has to be maintained. The drive may fail in case the temperature exceeds beyond limits. This is not the requirement of other methods of airflow control

(ii) The humidity profile in the textile process area may get disturbed, if some faults occur in VFD circuitry. This problem is not envisaged in other two methods of flow control, as their function is very simple.

(iii) The project also requires continual monitoring of modifications in the ducts, which can lead to failure of the system if the system pressure profiles get disturbed due to modifications. This is not the limitation of damper control mechanism.

Further the VFD frequency settings to be maintained for the project activity and its associated reduction in the electrical energy is governed by external factors like ambient temperatures which vary seasonally, and are beyond JST’s control. Therefore there is an element of risk associated to the reduction in the electrical energy consumption due to project activity over the crediting period.

JST was aware of risks related to implementing the project activity. JST faced and overcame the above barriers for the shear cause of reduction in the GHG emissions. It is ascertained that the project activity would not have occurred in the absence of the CDM simply because no sufficient policy, or other incentives exist locally to foster its implementation of such energy efficiency projects in India.

With goal of obtaining the proposed carbon financing for the project activity 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.

The continued investment in phases has been influenced by the Clean Development Mechanism related development at the United Nations Framework for Climate Change Convention.

Without the proposed carbon financing for the project the JST would not have taken the investment risks in order to implement the project activity. Therefore the project activity is not a part of the baseline scenario.
As stated above, the only other alternative available with JST in absence of project activity was the alternative 1: 'Continuation of the current situation'. Therefore in no project scenario (i.e. the baseline scenario), JST would have continued with the current situation wherein the damper control system is operative with no reduction in the electrical energy consumption and its associated green house gas reductions.

The project activity is additional and 29,511 tonnes of anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity over a 10-year crediting period.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

>>

2. The project boundary is the physical, geographical location of each measure (each piece of equipment) installed.

As per the Appendix B the project boundary is defined a "the physical, geographical location of each measure (each piece of equipment) installed". The project boundary for the project activity includes all equipment installation points. It covers all the electrical drives of the Humidification Towers where the technology has been adopted. Equipment installation points are listed in Enclosure I.

B.5. Details of the baseline and its development:

>>

The detailed computations of the energy baseline (Step-I) and emission baseline (Step –2) are based on the approved simplified baseline methodologies specified in appendix B for project category Type IIC. For baseline analysis, data/information was collected from the West Bengal State Electricity Board and was used as under for total emission baseline.

The baseline study is a two Step study conducted to determine the Baseline emissions over the crediting period in absence of project activity.

Step – I: Determination of Energy Baseline

Step – II (a): Choice of the grid **-** The current delivery system is studied for selection of a realistic grid representing the factual scenario associated with the project activity

Step – II (b): Determination of carbon intensity of the chosen grid – West Bengal State Electricity Board's Power Generation status: Present generation mix, sector wise installed capacities, emission co-efficient, station heat rate and generation efficiencies are used to arrive at the net carbon intensity/baseline factor of the chosen grid.

STEP – I: Determination of the Energy Baseline (before implementation of project activity)

ENERGY BASELINE

The annual energy baseline values (annual energy consumption in absence of project activity) for the crediting years are calculated by monitoring the "power that would be consumed" and "operating hours" of the devices installed based on the guidance provided in paragraph 4 and 8 of Type II.C. of Appendix B.

The "power that would be consumed" by the device in absence of the project activity at an operating frequency of 50Hz, is recorded based on the bench tests conducted at JST and the "operating hours" of device are based on the departmental operating hours. Details are provided Enclosure-I.

The guidance provided in paragraph 4 also takes into consideration the average technical distribution losses for the grid serving the locations where the devices are installed, expressed as a fraction.

As per the Tariff[6] the WBSEB claimed that the T&D loss in 1999-2000 was estimated at 39.2%. The overall loss reduced by 1% in 2000-01 and by 2% for the year 2001-02 in the LV and MV levels where bulk losses occurred.

However since the T&D losses as per WBSEB includes both technical and commercial losses and quantifying the technical losses only would not be feasible we will consider T&D losses to be zero while estimating the energy baseline to be on the conservative side.

STEP – II (a): CHOICE OF THE GRID

The Current Delivery System in India and West Bengal were studied for selection of a realistic grid representing the factual scenario associated with the project activity. Relevant information/data are provided herein.

CURRENT DELIVERY SYSTEM

Indian power grid system (or the National Grid) is divided into five regional grids namely Northern, North Eastern, Eastern, Southern and Western Region Grids. The Eastern Regional Grid consists of Bihar, Jharkhand, Orissa, West Bengal, Damodar Valley Corporation (DVC) and Sikkim state sector grids. These regional grids have independent Load Dispatch Centres (LDCs) that manage the flow of power in their jurisdiction. Power generated by state owned generation units and private owned generation units would be consumed totally by respective states. However there is a deviation in the case of West Bengal Grid. The deviation has been dealt with in the following section. The power generated by central sector generation plants will be shared by all states forming part of the grid in fixed proportion. This central share amount has been allocated for the West Bengal State.

GRID SELECTION

The total installed capacity of the power generating stations in the National Grid, Eastern Regional Grid and the West Bengal State Grid are provided given below.

Table B-1: Current Power Sector Scenario

[6] Source:http://www.wberc.org/wberc/tariff/wbseb/tariff/ord&pet_2001/index.htm

Monitored Capacity (MW)	
National Grid	107877
Eastern Region Grid	16755.97
West Bengal State Grid	4784.38
Source: General Review 2002-2003, Table No. 2.3	

The appropriate grid level for the project activity's affect on the emissions caused at the thermal power plants has been assessed based on the 'Size of the project activity'. The project activity would be saving on an average 0.4MW of power and the reduced power is 0.00037% of national grid capacity, 0.0024% of the regional grid capacity and .0083% of state grid capacity. It is too small to have a significant impact on the national grid or regional grid in terms of marginally effecting changes in the generation and dispatch system (operating margin) or delay future power projects that may be commissioned during the crediting period (build margin) in the national or eastern regional grid. Therefore, the principal effect of the project activity would be on the lowest level of the grid i.e. the carbon intensity of the West Bengal state grid.

Over and above the small size of the project activity, it was noted that the project activity is connected to the grid operated by the West Bengal State Electricity Board (WBSEB) and would be reducing the power load from the power plants comprising the WBSEB. We may therefore conclude that WBSEB Grid is the most representative system boundary for the project activity. Further the JST plant is connected to the WBSEB grid.

We would therefore determine the carbon intensity of the grid mix which is governed by WBSEB in Step II to arrive at the baseline emission factor for baseline emission calculations for the project activity's crediting period.

The WBSEB has the primary responsibility for the supply of electricity that may be required within the state and for transmission and distribution of the same in most efficient manner.

The transmission and distribution system in West Bengal has access to electricity generated from:

- West Bengal's share from generating stations set up by the Central Government ["Central Sector Plants"]

The central government (Government of India) owns power generation plants managed by Government of India Enterprises like National Thermal Power Corporation Ltd (NTPC), National Hydroelectric Power Corporation Ltd (NHPC), Damodar Valley Corporation (DVC) and Power Grid Corporation of India

(PGCIL) Chukka. Power generated by the central sector is being fed to the grid, which is accessible to all states in the region. The power generated by central sector generation plants is shared by all states forming part of the grid in fixed proportion as mentioned above. As per the Availability Based Tariff (ABT) Notification the central sector power generating units would operate at a plant load factor of 80% and West Bengal state has to make payments for its total share in the central sector. Therefore West Bengal would have to draw its allocated share from the central sector generating stations. India, nuclear power generation is allowed only by Central Sector Organisations. However West Bengal has no share in the nuclear power generating stations. Therefore the power mix may be thermal, hydro and wind.

- West Bengal's State owned generation

The state sector in West Bengal comprises of three entities namely West Bengal State Electricity Board (WBSEB), West Bengal Power Development Corporation Limited (WBPDCL) and Durgapur Projects Limited (DPL). WBSEB currently has a total generating capacity of 253.5 MW (details provided in the Table B-4 given below) and is primarily into transmission and distribution. WBPDCL is in the business of electric power generation and supply and has a total generating capacity of 2690 MW.

DPL operates a power plant with a capacity of 395 MW and is engaged in all the three functional areas of a power utility – the generation, transmission and distribution. The company is generating power from its six power units and distributing power at 11KV in its licensed area at Durgapur and the surplus power is transmitted to WBSEB Grid.

- West Bengal's Private owned generation

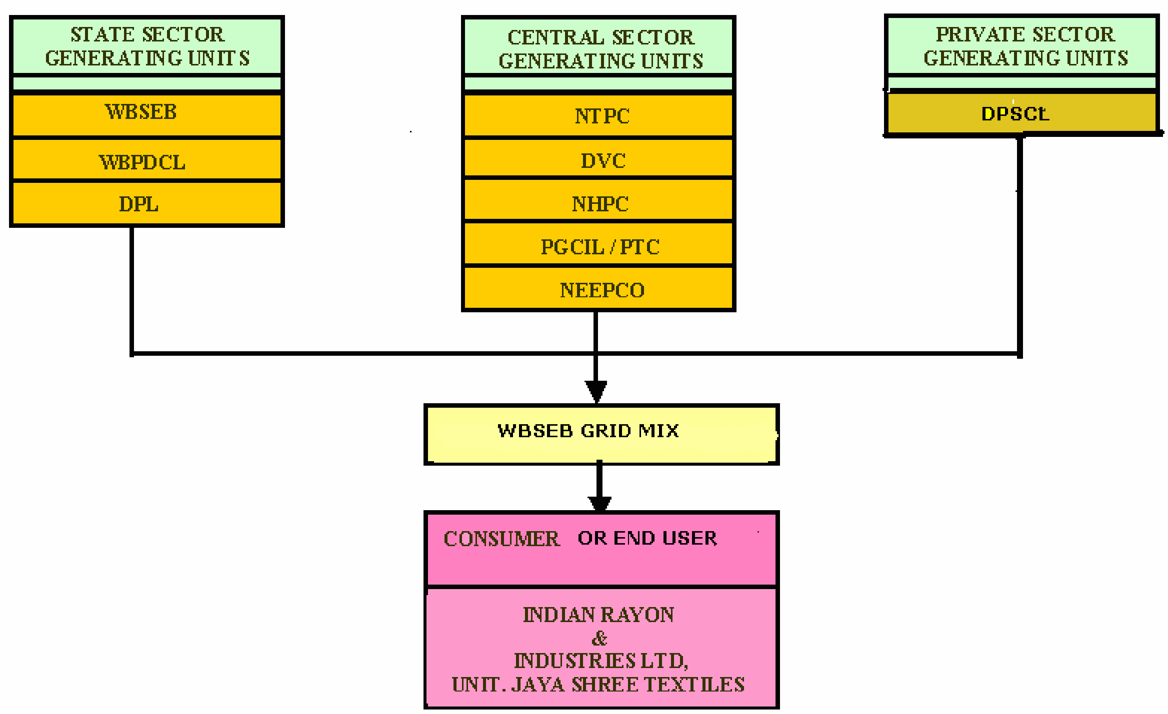
In addition to the State Sector, the other entities operating in West Bengal as Private Companies are CESC Limited (with a generating capacity of 1065 MW) and Dishergarh Power Supply Company Limited (with a generating capacity of 40 MW).

CESC Limited is the oldest private utility in India and started its operations in 1987. It generates and distributes electricity in and around Kolkata. It has five thermal power generating stations and a vast transmission and distribution network of network of 13,882 circuit km spread over 567 sq. km. in Kolkata and the adjoining districts. The present generation capacity is 1065 MW and the system's maximum demand was 1238 MW as on March 31st March, 2001.

Dishergarh Power Supply Company Limited is supplying power to Asansol-Raniganj industrial belt of West Bengal and is a part of the grid mix.

However both these private owned generation units from CESC and Dishergarh Power Supply Company Limited are not entirely dispatched into the WBSEB transmission systems. They have separate jurisdiction of operation and therefore do not contribute to the grid mix of the WBSEB. Therefore these two private companies have not been considered for estimation of the baseline carbon intensity of the grid mix of WBSEB. There has been a small amount of purchase from Dishergarh Power Supply Company Limited which has been considered in the grid mix.

Figure 1: Flow Chart of Current Delivery system of West Bengal



STEP–II (b): DETERMINATION OF CARBON INTENSITY OF THE CHOSEN GRID

The carbon intensity or baseline emission factor of the WBSEB is calculated as a Combined Margin.

As per the provisions of paragraph 5 of Appendix B of Simplified Modalities and Procedures for Small Scale CDM Project Activities [FCCC/CP/2002/7/Add.3, English, Page 21], the emission coefficient (measured in kg CO_2equ/kWh) for the electricity displaced would be calculated in accordance with provisions of paragraphs 6 and 7 for category I.D projects.

The provisions of paragraph 7 of Appendix B requires the emission coefficient (measured in kg CO_2equ/kWh) to be calculated in a transparent and conservative manner as:

(a)The average of the “approximate operating margin” and the “build margin” (or combined margin)

OR

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

The Built Margin has been re-defined as the weighted average emissions (in kgCO_2equ/kWh) of recent capacity additions to the system, which capacity additions defined as the greater (in MWh) of most recent[7] 20 per cent[8] of existing plants or the 5 most recent plants as in Annex 2 (Amendment to Appendix B of the simplified modalities and procedures for small-scale CDM project activities) of Executive Board [12].

Complete analysis of the system boundary’s electricity generation has been carried out for the calculation of the emission coefficient as per point 7 (a) and (b) given above and for baseline emission calculations.

COMBINED MARGIN

The baseline methodology suggests that the project activity will have an effect on both the operating margin (i.e. the present power generation sources of the grid, weighted according to the actual participation in the state grid mix) and the build margin (i.e. weighted average emissions of recent capacity additions) of the selected WBSEB grid and the net baseline emission factor would therefore incorporate an average of both these elements.

[7] Generation data available for the most recent year.
[8] If 20% falls on part capacity of a plant, that plant is included in the calculation.

OPERATING MARGIN

The baseline factor as per the Operating Margin takes into consideration the present power generation mix excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation1 of the selected grid and the actual emission factors of the thermal power plants.

PRESENT POWER GENERATION MIX

The consumers of the West Bengal state get a mix of power from the different sources. The figures of installed power capacity, share of the state in the central pool, and actual plant availability decides the content of power. The real mix of power in a particular year is however based on actual units generated from various sources of power. JST is connected to the West Bengal State Electricity Board (WBSEB) which gets its major portion of power from WBSEB, WBPDCL and DPL along with the central sector generation plants. The actual generation data of the WBSEB for the year 2000-2001, 2001 – 2002 and 2002 – 2003 are available in the form of documents which includes own generation and purchase from central sector power plants is given below in Table B-2, B-3, B-4 and B-5.

Table: B-2 – Power Generation Mix of WBSEB grid consisting of Own Generating stations[9] and purchase from other State owned and Private Generating Stations (2000-2001)

Sr. No.	Energy Source		Purchase/ Own Generation in MkWh (2000-2001)
I.	**West Bengal State Sector**		
1.	Thermal (Coal Based)		
	WPDCL	Kola ghat	6711.28
		Bakereswar	
	WBSEB	Bandel	2128.549
		Santhandih	1053.552
	DPL		131.33
A	**Thermal Coal Based Total:**		**10024.711**
2.	Thermal (Gas Based)		
	WBSEB	Kasbha GTPS	3.707
		Haldia GTPS	2.573
		Siliguri GTPS	0.000
B.	**Thermal Gas Based Total:**		**6.280**
1.	Hydro		
	WBSEB	Jaldhaka	92.951
		Rammam	233.088
		Teesta Canal Falls	118.945
C.	**Hydro Total**		**444.984**
II.	**West Bengal Private Sector**		
1.	DPSCL(coal)		148.14
D.	**Private Sector Total**		**148.14**
E.	**State Sector Total**		**10624.115**

[9] Both Bandel ans Santhaldih Thermal Power stations have been handed over to WBPDCL by WBSEB w.e.f 1st July, 2001(refer pg. 11, WBSEB Annual Report 2001-2002)

Table: B-3 – Power Generation Mix of WBSEB grid from the Central Generating Stations[10] (2000-2001)			
Sr. No.	**Energy Source**		**Purchase in MkWh (2000-2001)**
I.	**West Bengal's Share in Central Sector Schemes**		
A	**Thermal Coal Based**		
1.	NTPC Thermal (Coal Based)		
	NTPC	Farakka T.P.S (1600 MW)	
		Kahalgaon T.P.S (840 MW)	
		Talcher T.P.S (1000 MW)	2106.38
	NTPC share of Thermal Coal Based Total:		**2106.38**
2.	DVC Thermal (Coal Based)[11]		667.536
a.	**DVC Thermal (Coal Based) Total**		**667.536**
	Total Thermal Coal Based		**2773.916**
B	**Thermal Gas Based**		
1.	DVC Thermal (Gas Based)[14]		1.528
	NEEPCO[12]	Assam GBPP	122.56
		Agartala GBPP	
	Total Thermal Gas Based		**124.088**
C	**Hydro Based**		
4.	PGCIL Hydro		
	PGCIL / PTC	Chukha H.P.S.	520
		Kurichhu H.P.S.	0
5.	NHPC	Rangit H.P.S.	113.24
6.	NEEPCO	Kopili H.P.S	66.19
		Doyang H.P.S	
7.	DVC Hydro[14]		23.745
	Total Hydro		**723.175**
D.	**Central Sector Total**		**3621.179**

[10] Enclosure-III

[11] Note: The total DVC generation contributed to the WBSEB grid mix was available in the WBSEB annual reports for the year 2000-2001, 2001-2002 and 2002-2003. The DVC Coal, Gas and Hydel generations are calculated based on the total generation mix of DVC for the year 2000-2001, 2001-2002 and 2002-2003

[12] The total NEEPCO generation contributed to the WBSEB grid mix was available in the WBSEB annual reports for the year 2000-2001, 2001-2002 and 2002-2003.The NEEPCO Gas and Hydel generations are calculated based on the total generation mix of NEEPCO from the annual reports for the year 2000-2001, 2001-2002 and 2002-2003

Table: B-4 – Power Generation Mix of WBSEB grid from the Own Generating Stations, purchase from other State and Private Generating Stations (2001-2002 and 2002-2003)

Sr. No.	Energy Source		Own Generation/ Purchase in MkWh (2001-2002)	Own Generation/Purchase in MkWh (2002-2003)
I.	**West Bengal State Sector**			
1.	Thermal (Coal Based)			
	BPDCL	Kola ghat	10334.67	12411.80
		Bakereswar		
		Bandel		
		Santhandih		
	DPL		350.08	344.38
A	**Thermal Coal Based Total:**		**10684.75**	**12756.18**
2.	Thermal (Gas Based)			
	WBSEB	Kasbha GTPS	0.629	0.163
		Haldia GTPS	0.00	0.024
		Siliguri GTPS	0.00	0.000
B.	**Thermal Gas Based Total**		**0.629**	**0.187**
1.	Hydro			
	WBSEB	Jaldhaka	137.273	124.09
		Rammam	239.275	221.348
		Teesta Canal Falls	169.37	163.979
C.	**Hydro Total**		**545.918**	**509.417**
II.	**West Bengal Private Sector**			
2.	DPSCL (coal)		153.69	151.95
D.	**Private Sector Total**		**153.69**	**151.95**
E.	**State Sector Total**		**11384.987**	**13417.734**

Table: B-5 – Power Generation Mix of WBSEB grid from the Central Generating Stations (2001-2002 and 2003)				
Sr. No.	**Energy Source**		**Purchase in MkWh (2001-2002)**	**Purchase in MkWh (2002-2003)**
I.	**West Bengal's Share in Central Sector Schemes**			
	Thermal Coal Based			
1.	NTPC Thermal (Coal Based)			
	NTPC	Farakka T.P.S (1600 MW)	1875.82	516.75
		Kahalgaon T.P.S (840 MW)		
		Talcher T.P.S (1000 MW)		
a.	**NTPC Thermal Coal Based Total:**		**1875.82**	**516.75**
2.	DVC Thermal (Coal Based)[13]		653.603	589.809
b.	**DVC Thermal (Coal Based) Total**		**653.603**	**589.809**
A.	**Total Thermal Coal Based**		**2529.423**	**1106.559**
	Thermal Gas Based			
3.	DVC Thermal (Gas Based)[17]		1.538	0.568
	*NEEPCO	Assam GBPP	148.86	173.157
		Agartala GBPP		
B.	**Total Thermal (Gas Based)**		**150.398**	**173.725**
C	**Hydro Based**			
4.	PGCIL Hydro			
	PGCIL / PTC	Chukha H.P.S.	525.89	486.59
		Kurichhu H.P.S.	29.04	99.81
5.	NHPC	Rangit H.P.S.	139.48	127.47
6.	*NEEPCO	Kopili H.P.S	70.136	45.838
		Doyang H.P.S		
		Ranganadi H.P.S		
7.	DVC Hydro[17]		25.019	20.053
	Total Hydro		**789.565**	**780.238**
D.	**Central Sector Total**		**3469.39**	**2060.522**

[13] Note: The total DVC generation contributed to the WBSEB grid mix was available in the WBSEB annual reports for the year 2000-2001, 2001-2002 and 2002-2003. The DVC Coal, Gas and Hydel generations are calculated based on the total generation mix of DVC for the year 2000-2001, 2001-2002 and 2002-2003

EMISSION FACTORS

The emission factors used are given in Table B-5 and are based on a study from the OECD [OECD, 2000] and on the IPCC-guideline (IPCC, 1995). The emission factors vary widely depending on the type of fuel used.

Table B-6 Emission factors (OECD, 2000/ IPCC, 1996)

Source	Emission Factor (tCO_2/TJ)
Nuclear	0
Biomass	0
Hydro	0
Solar	0
Wind	0
Natural Gas	56.10
Coal	96.10

Standard emission factors given in IPCC for coal & gas (Thermal generation) are applied over the expected generation mix and net emission factors are determined for each year.

EFFICIENCY

The most important parameter in estimating the emissions is the thermal efficiency of the power plant. The net energy consumption norms were based on best efficiency for each of the technologies considered. As per the CEA Performance Report, the estimated weighted average operating Station Heat Rate at All India basis are 2763 Kcal/kWh, 2755 Kcal/kWh and 2745 Kcal/kWh and average thermal efficiency of 31.13%, 31.22% and 31.33% for the year 2000-2001, 2001-2002 and 2002-2003 respectively. As per the same report the estimated weighted average operating Station Heat Rate for the Eastern Region are 3306.02 Kcal/kWh, 3712.04 Kcal/kWh and 3302.87 Kcal/kWh and average thermal efficiency of 26.01%, 23.17% and 26.04% for the year 2000-2001, 2001-2002 and 2002-2003 respectively. The percentage of carbon that is not burnt is very low and, hence, complete combustion was assumed. On a conservative basis average efficiency for base line calculations for operating margin and built margin is considered as per the average thermal efficiency estimated based on the operating Station Heat Rate at All India basis.

Average efficiency of gas based thermal plants in West Bengal as against the standard norms works out to be around 40%[14].

BUILD MARGIN

The baseline factor as per the Build Margin takes into consideration the delay effect on the future projects. As per the proposed baseline methodology, the baseline factor for "build margin" is the weighted average emissions (in kg CO_2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants.

In case of WBSEB grid, the total power generation of the most recent 20% of existing plants is 3197 million units which is greater than the total power generation of 5 most recent plants built for the WBSEB grid. Therefore for our build margin calculation we would take into consideration the 6 most recent plants which accounts for 20% of the existing plants built in West Bengal as given below in Table B-6.

Table: B-7– 20% of the most recent plants built in West Bengal

Sl. No.	Year of Commissioning / Year of Purchase	Plant	MW	Own Generation/Purchase for 2002-03 (MU)
1	2001	Bakreswar U-2	210	2492.153
2	2001	Bakreswar U-3	210	
3	2000	Bakreswar U-1	210	
4	2000	NEEPCO (gas)	375	173.157
5	2000	NEEPCO (hydro)	730	45.838
6	1999	PGCIL Chukha (Hydro)	336	486.59
Total				3197.738
20% of Gross Generation-15478.256 MU				3095.6512
Coal based				2492.153
Gas Based				173.157
Hydro based				532.428
% of generation by coal out of total				77.93487146
% of generation by gas out of total				5.414983967
% of generation by hydro out of total				16.65014457

[14]Source-www.worldbank.org/html/fpd/energy/subenergy/energyissues20.pdf

BASELINE EMISSIONS

The main GHG emissions in this system boundary arise from burning fossil fuels for electricity generation.

In addition to the emissions arising from fossil-fired power generation, additional CO_2 emissions occur during the transport of coal from coalmines (or ports). In the eastern region coalfields are not far from the coal-fired power stations. There is no such raw material transportation distance used in the project activity as in the case of the coal-fired power stations. This means transport emission will be nil in the project activity. Because of a lack of data on average transport distance for coal to power stations in West Bengal we have not included fuel transport emissions in the system boundary of both the current situation and the project. This also provides a conservative estimate of the emission reductions.

The baseline emissions are arrived at based on the above mentioned baseline emission factor calculated as Combined Margin and the power consumption of the devices in the project boundary in absence of the project activity.

Leakage:

The project activity involves installation of variable frequency drives to the rotor of the electric drives of the Humidification Towers to vary the flow rate of supply air at variable speed.

As per the Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, "if the energy efficiency technology is equipment transferred from 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. The same may be verified on site. Therefore there would be no net change of anthropogenic emissions by sources of greenhouse gases outside the project boundary. Therefore as per the AMS – II-C guidance JST does not need to consider these emission sources as leakage in applying this methodology. Therefore JST has not taken leakage into consideration.

Based on the Combined Margin Method detailed above, (see section E for calculations) the project activity will reduce 2,95,11 tonnes of CO2 in 10 year of credit period. Since, the project activity is not a baseline scenario, without project activity there will be emission as per the carbon intensity of the grid (0.97 $kgCO_2/kWh$). Therefore the project activity implementation reduces the energy requirement of the devices in the project boundary and its associated emission reductions.

Date of completing the final draft of this baseline section (DD/MM/YYYY): 20th August, 05

Name of person/entity determining the baseline: Indian Rayon & Industries Limited: Unit Jayashree Textiles and their associated experts

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

>>

C.1.1. Starting date of the small-scale project activity:

>>
February, 2000

C.1.2. Expected operational lifetime of the small-scale project activity:

>>
25y

C.2. Choice of crediting period and related information:

>>

C.2.1. Renewable crediting period:

>>
NA

C.2.1.1. Starting date of the first crediting period:

>>
NA

C.2.1.2. Length of the first crediting period:

>>
NA

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>
November 2000
The equipment installations for the project started in November, 2000. The zero date for CER calculations and quantification of CO_2 reduced for this project would therefore be November 2000.

C.2.2.2. Length:

>>

10 y

SECTION D. Application of a monitoring methodology and plan:

>>

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

>>

Title: Monitoring Methodology for the category IIC - Demand-side energy efficiency programmes for specific technologies

Reference: 'Paragraph 8 & 9' as provided in Appendix B1 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.

This monitoring methodology involves metering of the "energy use" of an appropriate sample of the devices installed.

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

>>

As per the provisions of paragraph 14 of 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. Our project activity is eligible as a small-scale CDM project of Type IIC category and therefore the monitoring methodology and plan is consistent with the guidance provided in paragraph 8 & 9 of Appendix B.

Moreover project activity's revenue is based on the (electrical) energy savings after project activity implementation. GHG reductions are to be achieved by reducing the electrical energy consumption due to reduced technical losses from energy efficiency improvement measures. The monitoring methodology thus includes measured data on 'electrical energy consumption' before and after project activity implementation for each of the devices. With this data information, a reliable estimate of the amount of emission reductions will be made.

Description of the Monitoring Plan

The Monitoring procedures define a project-specific standard against which the project's performance (i.e. GHG reductions) and conformance with all relevant criteria will be monitored and verified.

The aim is to enable this project have a clear, credible, and accurate set of monitoring, evaluation and verification procedures. The purpose of these procedures would be to direct and support continuous monitoring of project performance/key project indicator to determine project outcomes, greenhouse gas (GHG) emission reductions.

The project revenue is based on the quantum of energy consumption reduced as compared to the baseline energy consumption before project activity implementation.

The monitoring and verification system would mainly comprise of the power meters installed at the sample sites in order to measure the ‘energy use’ of the equipment after project implementation

The power meters used for monitoring of the project activity will comprise microprocessor-based instruments of reputed make with desired level of accuracy. All instruments will be calibrated and marked at regular intervals so that the accuracy of measurement can be ensured all the time.

Monitoring Approach

The general monitoring principles are based on:

- Frequency
- Reliability
- Registration and reporting

Frequency of monitoring

JST has installed power meters to monitor and record the ‘energy use’ data for the sample sites on a continuous basis.

Sample Selection

For the Worsted Division of JST the sample sites are to be selected randomly and consist of 10% of the total number of Supply Air Fans and 10% of the total number of Return Air Fans.

For the Flax Spinning Division of JST the sample sites are to be selected randomly and consist of 10% of the total number of Supply Air Fans and 100% of the total Return Air Fans. Since there are only two Return Air Fans 100% of the sample has been considered in order to get accurate results.

Reliability

All measurement devices will be of microprocessor based with best accuracy and procured from reputed manufacturers. 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 results all power measuring instruments would be calibrated once a year for ensuring reliability of the system. All instruments carry tag plates, which indicate the date of calibration and the date of next calibration. Therefore the system ensures the final energy use data is highly reliable.

Registration and reporting

Registration of data is on-line in the control cabin through a microprocessor. However, hourly data logging will be there in addition to software memory. Daily, weekly and monthly reports are prepared stating the cumulative energy use.

D.3 Data to be monitored:

>>

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)	Frequency	Frequency	Hz	m	Daily	100%	daily log sheet	CP+2	The set frequency will be recorded on a daily basis.
D3(b)	Electrical Energy	Total Electricity Consumed at the various operating frequencies	kWh	m	Continuous basis for the selected sample	sample	Electronically online system/ Log sheet	CP+2	The electrical energy consumed by the equipment at the different operating frequencies is determined by Metered Systems The sampling sites are detailed in the Monitoring Schedule. The monitoring shall include annual checks of a sample of non-metered systems to ensure that they are operating
In absence of 'Power Meters' the D3(c) and D3(d) parameters would be used for 'Energy use' calculations									
D3(c)	Power	Power Consumed at the various operating frequencies	kW	m	Annually		Log Sheet	CP+2	The data will be collected for all motors at various operating frequencies by bench tests.
D3(d)	Time	Operating Hours	hr	m	Annually		Log Sheet	CP+2	

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Are QA/QC procedures planned for these data?	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
For electricity reduction			
D3(a): Frequency	Low	Yes	These QA / QC procedures are as per the manufacturer.
D3(b): Electrical Energy	Low	Yes	These QA / QC procedures are as per the manufacturer.
D3(c): Power	Low	Yes	These QA / QC procedures are as per the manufacturer.
D3(d): Time	Low	Yes	These QA / QC procedures are as per the manufacturer.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

The Plant In-Charge would be responsible for monitoring and archiving of data required for estimating the emission reductions. He would be supported by the shift in-charge who would continuously monitor the data logging and would generate daily, monthly reports

D.6. Name of person/entity determining the monitoring methodology:

>>

Indian Rayon & Industries Limited: Unit Jayashree Textiles and their associated experts

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>>

The project activity is an energy efficiency measure adopted to reduce energy consumption and its associated CO_2 reductions in the Humidification Towers. The GHG emission reductions are determined as the difference in the baseline emissions and the emissions after project activity implementation.

The baseline emissions are estimated as the emissions caused at the power generating station end due to generation of electrical energy used in the project boundary. The baseline emissions would be a multiplicative value of the 'energy baseline/energy use' and the emission coefficient of the grid. The project activity would contribute to reduction in the 'energy baseline/energy use' resulting in emission reductions. The emissions after project activity implementation are estimated as the emissions caused at the power generating station end due to generation of electrical energy used in the project boundary. The emissions after project activity implementation would be a multiplicative value of the 'energy use' and the emission coefficient of the grid. The difference in the baseline emissions and emissions after project activity implementation would determine the additional emission reduction units.

Baseline Emissions

Energy Baseline Estimation as per paragraph 4 of Appendix B :

EB = Σ i(ni . pi . oi)/(- l)

Where

EB = annual energy baseline in kWh per year

i = devices for which the energy efficiency measure is operating during the year, implemented as part of the project.

Σ i = the sum over the group of "i" devices

ni = the number of devices of the group of "i" devices

pi = the power of the devices of the group of "i" devices

oi = the average annual operating hours of the devices of the group of "i" devices

l = average technical distribution losses for the grid serving the locations where the devices are installed, expressed as a fraction.

Emission Baseline Estimation as per paragraph 5 of Appendix B:

The energy baseline is multiplied by an emission coefficient (measured in kg CO_2equ/kWh) for the electricity displaced calculated in accordance with provisions of paragraph 7 for category I.D projects. The formulae used for Emission Coefficient is detailed in E.1.2

Emission Calculations after Project Implementation		
Emission Baseline	=	Energy Baseline X Emission Coefficient (kg/kwh)

Emission Coefficient Estimation: Please refer to section E.1.2

Emissions after Project Implementation: Please refer to section E.1.2.1

GHG Reductions: Please refer to section E.1.2.5

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

>>

Emission Coefficient Estimation:

As mentioned in Section B5 West Bengal State Grid is selected for grid analysis and the emission coefficient and baseline anthropogenic emissions from the fossil fuels of the grid are estimated based on the guidance provided in Paragraph 7 and the formulae provided below. The net baseline factor of the grid is based on the combined margin approach where operating margin excluding the low cost power stations (hydro) and the build margin of the 5 most recent power plants are taken into consideration in a most conservative manner.

Formulae used for estimation of the anthropogenic emissions by sources of greenhouse gases of the baseline are as under.

OPERATING MARGIN EMISSION FACTOR

- **Baseline Power generation**

$P_{exclusion} = P_{tot} - P_{lrc}$ where,

Sl. No.	Symbolic Representation	Illustration
1.	$P_{exclusion}$	Power generation by all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;
2.	P_{tot}	Power generation by all generating sources serving the system
3.	P_{lcr}	Power generation by low cost resources (hydro, geothermal, wind, low-cost biomass, nuclear and solar generation);

- **Sectorwise baseline Power generation**

$$P_{n\%} = \frac{P_n}{P_{exclusion}} x100$$ where,

Sl. No.	Symbolic Representation	Illustration
1.	$P_{n\%}$	Share (in %) of power generation by each fuel used (coal/gas in present scenario), out of total power generation excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;
2.	P_n	Power generation by fuel used. (in Million kWh units)
3.	$P_{exclusion}$	Power generation by all sources, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

- **Calculation of Operating Margin emission factor**

$$OM_{exclusion} = \sum \left[\frac{E_n \otimes P_{n\%}}{Eff_n} \right]$$

For base years 2000-2001, 2001-2002 and 2002-2003 or the base year. The OM for the base year is as follows:

Sl. No.	Symbolic Representation	Illustration
1.	$OM_{exclusion}$	OM Emission factor of baseline calculated for 2001-2002, 2002-2003 and 2003-2004 the base year (tonnes/TJ)
2.	E_n	Emission factor (IPCC - factor) for each fuel type considered (e.g. coal, gas)
3.	$P_{n\%}$	Share (in %) of power generation by each fuel used (coal and gas in present scenario), out of total power generation excluding, power from low running cost plants.
4.	Eff_n	Average Efficiency of the power plant for each fuel type used.

BUILD MARGIN EMISSION FACTOR

- **Power plant wise baseline Power generation**

$$P_{n-recent\%} = \frac{P_{n-recent}}{P_{recent}} x100$$ where,

Sl. No.	Symbolic Representation	Illustration
1.	$P_{n\text{-}recent\%}$	Share (in %) of power generation by each fuel used (coal/gas) amongst the most recent 5 power plants, out of their total power generation;
2.	$P_{n\text{-}recent}$	Power generation by fuel used amongst the most recent 5 power plants. (in Million kWh units)
3.	P_{recent}	Power generation by the 5 most recent power plants which include all sources, including hydro, wind, low-cost biomass, nuclear and solar generation;

- **Calculation of Build Margin emission factor for each source of baseline generation mix**

$$BM_{yr} = \sum \left[\frac{E_n \otimes P_{n-recent\%}}{Eff_n} \right]$$

For base years 2000-2001, 2001-2002 and 2002-2003, where

Sl. No.	Symbolic Representation	Illustration
1.	BM_{yr}	OM Emission factor of baseline calculated for 2001-2002, 2002-2003 and 2003-2004 the base year (tonnes/TJ)
2.	E_n	Emission factor (IPCC - factor) for each fuel type considered (e.g. coal, gas)
3.	$P_{n-recent\%}$	Share (in %) of power generation by each fuel used (coal/gas) amongst the most recent 5 power plants, out of their total power generation;
4.	Eff_n	Average Efficiency of the power plant for each fuel type used.

- **Calculation of Combined Margin emission factor**

$$CM_{NET} = \frac{(OM_{exclusion} + BM_{YR})}{2}$$ where

Sl. No.	Symbolic Representation	Illustration
1.	CM_{NET}	Combine Margin Factor for 2001-2002, 2002-2003 and 2003-2004 base year
2.	$OM_{exclusion}$	OM Emission factor of baseline calculated for 2001-2002, and 2002-2003 the base year (kg/kWh)
3.	BM_{yr}	Build Margin for base year.(kg/kWh) - weighted average of emissions by recent 5 capacity additions

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:

>>

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

Emission Calculations after Project Implementation				
Step 1	**:**	CO_2 Emissions after project implementation	=	Energy Use after project implementation[15] X Emission Coefficient (kg/kwh)

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

>>

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 small-scale project activity emissions:

>>

Net CO_2 emissions by project activity (E1.2.1+E2.2.2) are zero.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs 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:

>>

Energy Baseline Estimation as per paragraph 4 of Appendix B: Please refer to section E.1.1

Emission Baseline Estimation as per paragraph 5 of Appendix B: Please refer to section E.1.1

Emission Coefficient Estimation: Please refer to section E.1.2.1

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:

>>

CO_2 Emission Reduction Calculations				
CO_2 Emission Reductions	=	CO_2 Baseline Emissions	-	CO_2 Emissions after project implementation

[15] Energy Use after project implementation is calculated as per formulae provided in paragraph 5

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

>>

Following tables indicate the baseline emission factors and emission reductions of each year, for Combined Margin.

Table E.1 – CO_2 emission reductions due to project activity

Sl. No.	Operating Years	Baseline Emission Factor (kg of CO_2 / kwh)	Baseline Emissions (kg of CO_2)	Emissions after project implementation (tonnes of CO_2)	CO_2 Emission Reductions (tonnes of CO_2)
1.	2000-2001	0.9769	8957.28	8343.79	613.49
2.	2001-2002	0.9750	8957.28	6779.25	2178.03
3.	2002-2003	0.9749	8938.91	6026.06	2912.85
4.	2003-2004	0.9749	9060.20	5666.89	3393.31
5.	2004-2005	0.9749	9060.20	5666.89	3393.31
6.	2005-2006	0.9749	9060.20	5666.89	3393.31
7.	2006-2007	0.9749	9060.20	5666.89	3393.31
8.	2007-2008	0.9749	9060.20	5666.89	3393.31
9.	2008-2009	0.9749	9060.20	5666.89	3393.31
10.	2009-2010	0.9749	9060.20	5666.89	3393.31

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts 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.

The Ministry of Environment and Forests (MoEF), Government of India has under the Environmental (Protection) Act 1986 promulgated a notification on 27 January 1994 (amended on 04/05/1994, 10/04/1997, 27/1/2000 and 13/12/2000) making environmental clearance mandatory for expansion or modernisation of any activity or for setting up new projects listed in Schedule I of the notification. EIA clearance is required for 29 categories of industries from the central government which can be broadly categorised under sectors of industries, mining, thermal power plants, river valley, ports, harbours and airports, communication, atomic energy, transport (rail, road, highway), tourism (including hotels, beach resorts).

For some projects, EIA is not needed, which includes Energy Efficiency Measures in existing industrial set-up. Ref. {http://www.envfor.nic.in}

The project activity has also resulted in annual electrical savings. The project activity has only positive environmental impacts – like reduction in coal consumption at thermal power plants and its associated emissions, which include carbon dioxide, Sulphur oxides, nitrogen oxides, SPM and RSPM. These aspects contribute to the regional and global benefits.

There are no negative environmental impacts from the installation of technologically upgraded energy efficiency equipments and instrumentation work. The technologies are easily transportable and installation does not require any major construction equipment.

The only emissions that take place during the whole project execution are the transportation of the implemented machineries and instruments. However considering the life cycle of the project and the other positive environmental aspects such energy conservation, coal conservation, air pollution abatement at thermal power plants the transportation emissions are negligible.

SECTION G. Stakeholders' comments:

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

>>

Since the project activity implementation involves a set of installations in the Humidification Towers (not requiring major transportation or other energy inputs), 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 this energy efficiency project has received encouraging comments from PCRA and the External Energy Auditor including BEE. 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.

- Eastern India Textile Mills Association (EITMA)

- Energy Auditor
- PCRA

JST communicated their plan to implement the project activity along with salient information of the project activity with all the stakeholders enlisted above to receive their comments/suggestions if any. The opinions expressed by them were recorded. Since the project activity is small it does not require any approvals and clearances from governmental organization.

G.2. Summary of the comments received:

>>

Eastern India Textile Mills Association (EITMA)

Eastern India Textile Mills Association (EITMA) is the leading Textile Mills Association in the Eastern India. JST shared their technology application with EITMA and have received their appreciation. EITMA will be providing full co-operation to JST in order to share the knowledge with other textile industries.

Energy Auditor:

As per the Energy Conservation Act, 2001 all industries of connected load above 5MW

JST meets the annual statutory requirements as mentioned above. The statutory auditor has reported the energy efficiency improvements in the Humidification Towers 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 is in the process of publishing a paper in the PCRA journal to share the knowledge acquired through research and development in the energy conservation with the Indian industries.

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:

>>

Not Applicable: Only positive comments have been received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Indian Rayon and Industries Limited, Unit of Jaya Shree 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:	011-24362252
FAX:	011 24363577
E-Mail:	rksethi@menf.delhi.nic.in
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:	-

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Till now funding from any Annex I party is not available.

Enclosure I: Reduction in Electricity Consumption

Enclosure II : Built Margin Calculations

Enclosure III : CER Calculations

Enclosure IV: Abbreviations

%	Percentage
ABT	Availability Based Tariff
BEE	Bureau of Energy Efficiency
BM	Build Margin
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Carbon Emission Reduction
CESC	Calcutta Electric Supply Company
ckt. Km	Circuit Kilo Metre
CM	Combined Margin
CO	Carbon Mono Oxide
CO_2	Carbon Di Oxide
DPL	Durgapur Projects Ltd
DPSCL	Dishergarh Power Supply Company Ltd
DVC	Damodar Valley Corporation
EB	Energy Baseline
EIA	Environment Impact Assessment
GHG	Green House Gases
GTPS	Gas Turbine Power Station
GWh	Giga Watt Hour
GWh/ Year	Giga Watt Hour per Year
H.P.S	Hydel Power Station
Hz	Hertz
IPCC	Intergovernmental Panel on Climate Change

IR & IL	Indian Rayon and Industries Ltd
JST	Jayashree Textiles
kg CO_2 equ/kwh	Kilo Gram Carbon Di Oxide equivalent per Kilo Watt Hour
kg/kwh	Kilo Gram per Kilo Watt Hour
KV	Kilo Volt
kw	Kilo Watt
kwh	Kilo Watt Hour
LDC	Load Despatch Centre
M & P	Modalities and Procedures
M & P	Modalities and Procedures
M & V	Monitoring and Verification
Mkwh	Million Kilo Watt Hour
MoEF	Ministry of Environment and Forests
MW	Mega Watt
NEEPCO	North Eastern Electric Power Corporation Ltd
NHPC	National Hydro Electric Power Corporation Ltd
NO_x	Nitrogen Oxides
NTPC	National Thermal Power Corporation
OECD	Organisation for Economic Co-operation and Development
OM	Operating Margin
PCRA	Petroleum Conservation Research Association
PGCIL	Power Grid Corporation of India Ltd
RSPM	Respirable Suspended Particulate Matter
SO_x	Sulphur Oxides
SPM	Suspended Particulate Matter
sq. km	Square Kilo Metre
T & D	Transmission and Distribution
T.P.S	Thermal Power Station
U	Unit
UNFCCC	United Nations Framework Convention on Climate Change
VFD	Variable Frequency Drive
WBPDCL	West Bengal Power Development Corporation Ltd
WBSEB	West Bengal State Electricity 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
8.	Annual Report, (2000-2001), WBSEB; Annual Report, (2001-2002), WBSEB; Annual Report, (2002-2003), WBSEB; Annual Report, (2000-2001), DVC;
9.	Central Electricity Authority, Govt. of India . www.cea.nic.in
10.	WBSEB Petition for 2001, WBERC, http://www.wberc.org/wberc/tariff/wbseb/tariff/ord&pet_2001/index.htm
11.	Annual Report, Ministry of Power, www.powermin.nic.in/report

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.	

- - - - -