



Voluntary Carbon Standard
Project Description

19 November 2007

22/03/2011

Version 04

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1 Description of Project:

1.1 Project title

6.5 MW cogeneration project in Akbarpur, Punjab.

Version: 04

Date: 22/03/2011

1.2 Type/Category of the project

Methodology Details	Description
Type	I-Renewable energy projects
Category	C – Thermal energy production with or without electricity; Version 18
Reference	http://cdm.unfccc.int/filestorage/NGP9SCJXDTWBMRQ15E4LHAY2K06Z7U/EB56_repan18_AMS-I.C_ver18.pdf?t=NEV8MTI5ODkwMDI1OC4xNw== HgRBqY0CWByIgY1cnJaImCMYnvc=
Sectoral scope	1: Energy industries (renewable - / non-renewable sources)

The project activity is not a Grouped project

1.3 Estimated amount of emission reductions over the crediting period including project size:

350,440 tonnes CO₂ equivalent emissions reductions over the crediting period of 10 years duration.

- Type of project activity: Project¹

Years	Estimation of annual emission reductions in tonnes of CO ₂ e
30/03/2009 -29/03/2010	35,044
30/03/2010 -29/03/2011	35,044
30/03/2011 -29/03/2012	35,044
30/03/2012 -29/03/2013	35,044

¹ According to the VCS program guidelines paragraph 5.1, the project activity falls under the “projects” group whose estimated emissions reductions are between 5,000 and 1,000,000 tCO₂e per year

Years	Estimation of annual emission reductions in tonnes of CO ₂ e
30/03/2013 -29/03/2014	35,044
30/03/2014 -29/03/2015	35,044
30/03/2015 -29/03/2016	35,044
30/03/2016 -29/03/2017	35,044
30/03/2017 -29/03/2018	35,044
30/03/2018 -29/03/2019	35,044
Total estimated reductions (tonnes CO ₂ e)	3,50,440
Total number of crediting years	10
Annual average estimated reductions over the crediting period (tCO ₂ e)	35,044

1.4 A brief description of the project:

The project activity is being implemented in the Sangrur district in Punjab at the textile unit of Gillanders Arbuthnot & Co. Ltd (hereafter known as GACL).

The proposed project activity involves installation of a cogeneration plant comprising of one rice husk fired AFBC boiler with steam generation capacity of 34 TPH at 66 kg/cm² (g) pressure and 495° C temperature and a 6.5 MW multistage extraction cum condensing steam turbine generator. The project activity has been commissioned on 30th March, 2009 and is expected to produce 41.769 GWh of net electrical output per annum.

As per the Glossary of CDM Terms, as per point no. 4 of definition of Renewable Biomass (page 26 of Glossary of CDM terms Version 05) and annex 18, EB 23 the rice husk are considered as renewable biomass. The design of the project equipments allows using following fuels:

1. Rice husk (to the extent of 100%)
2. Sub bituminous coal in case of exigencies (to the extent of 100%)

Rice Husk is an agro waste generated from local rice mills and hence identified as Renewable Biomass. The project was conceived considering usage of 100% rice husk as fuel and emission reduction is estimated considering the same.

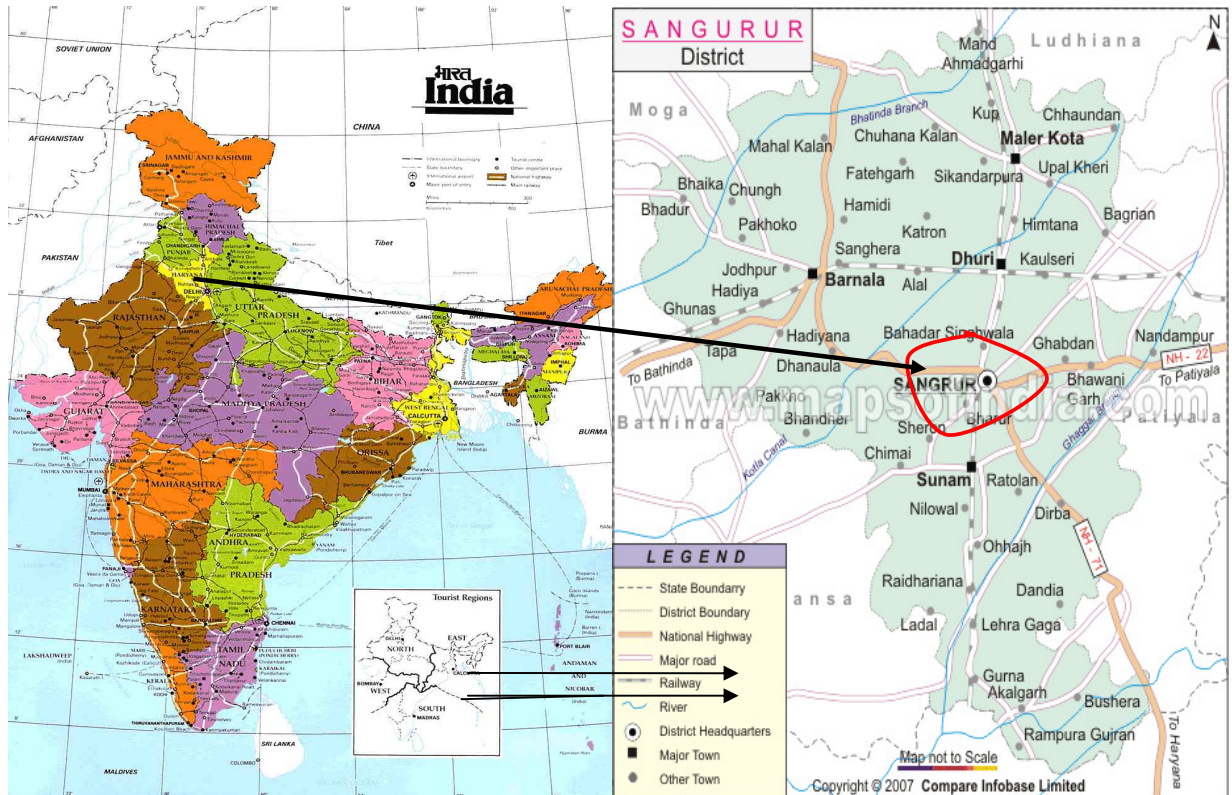
In the pre project scenario, heat requirement of the textile unit was met by a 3 TPH rice husk fired low pressure boiler and the electricity requirement was met by importing from NEWNE grid which is dominated by fossil fuel fired thermal power plants. Hence the baseline scenario for the project activity is as per para 15 (e) of the AMS I.C, version 18 which states *“Electricity is imported from the grid and/or produced in an on-site captive power plant (with a possibility of export to the grid); steam/heat is produced from renewable biomass”*. Also in line with para 28 of the methodology, which states *“.....emissions Reductions from heat generation are not eligible”* emission reductions for heat are not being claimed. The electricity generated by the cogeneration unit is not exported to the grid but only used for captive consumption of the textile unit. The rice husk based 6.5 MW cogeneration plant (project activity plant i.e. power producer) and the textile

unit (power consumer) are both the part of the GACL unit. Hence emission reductions only on account of net electricity supplied to the textile unit for captive consumption are being claimed for the project activity which is in line with the applied methodology.

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

Description	Details
Location	Village – Akbarpur PO Box – 1, Ahmedgarh District – Sangrur, Punjab – 148021
Latitude	31° 30' 0" N
Longitude	75° 22' 0" E
Nearest Airport	Amritsar is the nearest airport from Akbarpur which is 110 km from the project site.

The geographical location of the project activity is shown in the map given as follows:



1.6 Duration of the project activity/crediting period:

Description	Details
Project start date	30 th March 2009, commissioning date of turbine.
Crediting period start date	30/03/2009
Crediting period end date	29/03/2019
Duration of project activity	25 years ² ((corresponding to lifetime of the project activity)

1.7 Conditions prior to project initiation:

In the pre-project scenario power had been sourced from the NEWNE electricity grid, which is mainly connected with GHG intensive fossil fuel based power plants and process steam was generated from a 3 TPH rice husk fired boiler.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The project utilizes biomass (rice husk) which is carbon neutral fuel, to generate electricity and steam for captive consumption in a co-generation unit. The project activity therefore, reduces the emissions of GHG from the fossil fuel based power plants connected to the regional electricity grid and contributes in reducing global warming.

1.9 Project technologies, products, services and the expected level of activity:

The project activity involves electricity generation by direct-firing of biomass in the power plant. The biomass fuel is burned in a boiler to produce high-pressure steam. The steam is introduced into a steam turbine, where it flows over a series of aerodynamic turbine blades causing the turbine to rotate. The turbine is connected to an electric generator to convert the rotational energy into electricity. The electricity generated is used to cater the energy demands of the textile unit. The technical details of the major equipments are given as follows

Technical Details of Boiler

Type of boiler	Atmospheric Fluidized Bed Combustion
Make	M/s Thermax Limited
Number of boilers	1
Boiler capacity	34 TPH
Type of fuel	Rice husk

² Ref: Page 4 of "[Tool to determine the remaining lifetime of equipment](#)" EB 50, Annex 15

Boiler steam outlet pressure	66 kg/cm ² (g)
Boiler steam outlet temp.	495°C
Feed water temp.	105°C
Efficiency (Rice Husk)	81%

Technical Details of Turbo Generator

Type of Turbine	Multistage extraction cum condensing.
Number of turbine	1
Output capacity	6500 kW
Gear box output speed	1500 rpm
Inlet steam pressure	65 kg/cm ² (A)
Inlet steam temp	490°C

Apart from the above main equipments, other equipments as listed below are also part of the power plant.

- Cooling tower and circulating water system
- Fuel and ash handling systems
- RO Water system and Air Compressor Plant
- ESP to remove suspended particles from the flue gas
- Electrical and Instrumentation system

In terms of the safe and sound technology, the technology provider is experienced in this field. The boiler will be inspected by the boiler inspector ensuring that its operation is safe. Furthermore, consents to establish and operate from the Pollution Control Board will be confirmed that the factory adheres to environmental guidelines. Thus the technology implemented is environmentally safe and sound.

1.10 Compliance with relevant local laws and regulations related to the project:

The project activity has met with all the relevant and applicable laws and regulations with regards to the project activity:

Applicable regulation	Valid date of grant/amended	Ref. No.
Consent to establish	22/12/2006	EE-P/2006/SGR/LM/40/17270
Consent to operate	14/01/2011	169

Boiler operation certificate	02/01/2010	6461
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1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

The project activity uses rice husk as the primary fuel. The fossil fuel will be used during exigencies (for e.g. during rainy season) to cater the energy source which would affect the GHG emission reductions from the project activity.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The project activity primarily create an opportunity to generate carbon offsets from the direct and indirect reductions of GHG emissions by offsetting fossil fuel derived electricity generation at grid. The combustion of biomass material is used an alternative energy to supplement fossil fuel based energy. Hence the project activity does not create GHG emissions primarily for the purpose of its subsequent removal or destruction.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

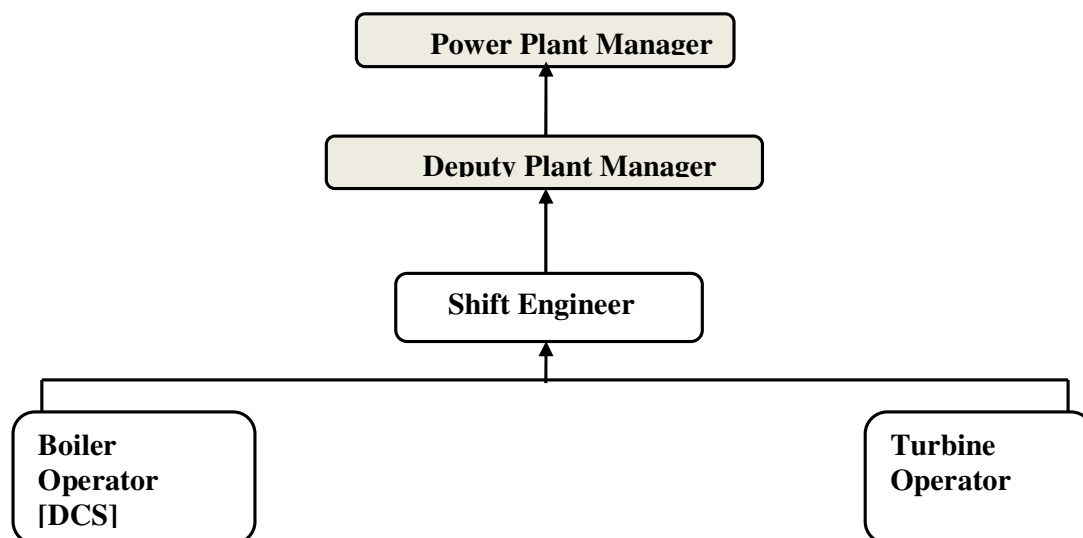
- The project has not created any other form of environmental credit.
- The project has initiated for CDM registration, however the project is yet to receive validation opinion from DOE. In the event the project get registered under CDM (VCS approved GHG program), PP will transparently declare the same to VCS registry and withdraw the program from VCS program and does not claim any credit under VCS registry from the date of CDM registration of the project activity.

1.14 Project rejected under other GHG programs (if applicable):

This project activity has not been rejected by any other GHG emission programs.

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

The Project proponent's roles and responsibilities is as follows:



Position	Roles & Responsibilities
Operators	Assisting Shift Engineer in overall operation of power plant
Shift Engineer	To ensure overall plant operation
Deputy Plant Manager	Responsible for overall performance of the equipments
Power Plant Manager	Periodical reviews the performance of the Wind Energy Division

CONTACT INFORMATION OF THE PROJECT PROPONENT

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1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

The project has contributed to sustainable, social, economic, technological and environmental development in many ways as listed below:

Economic:

The project has opened up business opportunities for direct and indirect businesses for technology provider, consultants, labor contractors, biomass suppliers, farmers and local villagers, thus promoting economical well being in the region.

Social:

The project activity will generate employment for skilled and unskilled labours to operate the power plant. The project activity will also enhance employment generation for the collection and transportation of biomass. This also offers the farmers an additional source of revenue.

Technological:

The project activity involves the installation of a cogeneration project in a textile mill. This will help in the promotion of such technology in the sector as well as enhance the skill sets of people involved in the operation and maintenance of the plant.

Environmental:

Use of biomass instead of high carbon intensive fossil fuel in the project activity contributes in reduction of GHG emissions. . The project also helps in reducing SOX and NOx emissions which are associated with fossil fuel consumption for power generation.

1.17 List of commercially sensitive information (if applicable):

Not Applicable

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

Methodology Details	Description
Methodology Title	Thermal energy production with or without electricity
Scale	Small Scale
Sectoral Scope:	1 – Energy Industries (renewable -/ non –renewable sources)
Version No	18
References	http://cdm.unfccc.int/filestorage/NGP9SCJXDTWBMRQ15E4LHAY2K06Z7U/EB56_repan18_AMS-I.C_ver18.pdf?t=NEV8MTI5ODkwMDI1OC4xNw==lHgRBqY0CWByIgY1cnJaImCMyNvc=

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

Applicability Criteria	Conformity to methodological requirements in the project
1. This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	Not applicable – Though the project activity comprises use of renewable biomass to generate steam for the process but in the absence of which, the steam requirements would have been met by biomass based boiler system. Therefore, the project activity doesn't displace fossil fuel for thermal energy generation.
2. Biomass-based co-generating systems consisting of steam generator(s) and steam turbine(s) are included in this category. For the purpose of this methodology "Cogeneration" shall mean the simultaneous generation of thermal energy and electrical Project activities that produce heat and power in separate element processes (for example, heat from a boiler and electricity from biogas engine) do not fit under the definition of cogeneration project.	Applicable and fulfilled– The project activity involves the installation of a biomass based cogeneration system supplying heat and electricity to the textile unit.

3. Emission reductions from a biomass cogeneration system can accrue from one of the following activities: (a) Electricity to a grid; (b) Electricity and/or thermal energy (steam or heat) for on-site consumption or for consumption by other facilities; (c) Combination of (a) and (b)	Applicable and fulfilled – In the baseline scenario, the heat requirement was met by a 3 TPH rice husk fired boiler and electricity requirement by NEWNE grid. Emission reductions for this project activity are being claimed only against the power generation from the project activity using biomass which is being used on site for captive consumption.
4. The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW	Applicable and fulfilled –The total rated thermal energy generation capacity of the project equipment i.e. the steam generating boiler is less than 45MWth as shown below³: Capacity of the boiler: 34TPH Outlet steam pressure: 66 kg/cm2(g) Outlet steam temperature: 4950C Enthalpy of the generated steam: 812.94 kcal/kg Inlet feed water pressure: 90 kg/cm2(g) Inlet feed water temperature: 105 °C Enthalpy of feed water: 106.64kcal/kg Total Net thermal energy generation capacity of the project boiler = total Net enthalpy of the generated steam at the boiler outlet = 34TPH x 1000kg/hr x (812.94-106.64) kcal/kg = 24014200kcal/hr = (24014200/860000)MW = 27.92MW (< 45MWth)
5. For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal.	Applicable and fulfilled: The project boiler is designed to fire either 100% biomass or 100% coal. Although the PP does not intend to fire coal, but coal may be fired in case of exigencies and if coal is fired during any monitoring period, then the case of co-firing becomes applicable. The thermal capacity of the unit is demonstrated based on output steam conditions irrespective of the

³ Source: Boiler P.O. dated 03rd November, 2006

	input fuel. Thus the installed capacity of the unit would hold good for co-firing of biomass and coal as well.
6.The following capacity limits apply for biomass cogeneration units: (a) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. (b) If the emission reductions of the cogeneration project activity are solely on account of thermal energy production (i.e., no emission reductions accrue from electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal; (c) If the emission reductions of the cogeneration project activity are solely on account of electrical energy production (i.e., no emission reductions accrue from thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW.	Applicable and fulfilled : As the project activity is a cogeneration system whose emission reductions are solely on account of electrical energy production and the total installed electrical energy generation capacity of the project equipment of the cogeneration unit is 6.5MW which is less than 15MW – so, applicability criteria (a) & (b) are not applicable but (c) is applicable and fulfilled.
7.In case electricity and/or steam/heat produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displaced.	Applicable and fulfilled - The electricity generated by the power plant will be supplied to the textile unit for captive consumption. A understanding between the power plant and textile unit have been made to specify that only the facility generating the energy will claim emission reductions from the energy displaced.
8. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category	Not applicable- The project activity does not seek to retrofit or modify an existing facility.
9.The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the	Applicable and fulfilled - The project activity is a new facility which involves installation of a 34 TPH biomass fired

case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraphs 4 to 6 and should be physically distinct from the existing units.	boiler and a 6.5 MW steam turbine. The thermal output capacity of the new boiler is 27.92 MW_{th}. The existing 3 TPH biomass fired boiler in the pre project scenario is replaced by the new 6.5 MW cogeneration plant. The existing 3 TPH boiler will not be operated as the steam requirement will be met by the new cogeneration unit. Thus the project activity is not the addition of renewable energy unit at an existing renewable energy facility and is physically distinct from the existing unit. The capacity limit of the project activity is in line with the requirements of paragraphs 4 to 6.
10. Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources⁵ provided: (a) Charcoal is produced in kilns equipped with methane recovery and destruction facility; or (b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable e.g. source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature.	Not applicable - The project activity is not a charcoal based energy generation system.
11. If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in emissions reduction	Not Applicable- as the project activity is not designed to fire solid biomass fuel

calculation.	
<u>Footnote 1:</u> That is, residential, industrial or commercial facilities.	Applicable – The project activity is an Industrial facility.
<u>Footnote 2:</u> Thermal energy generation capacity shall be manufacturer's rated thermal energy output, or if that rating is not available the capacity shall be determined by taking the difference between enthalpy of total output (for example steam or hot air in kcal/kg or kcal/m3) leaving the project equipment and the total enthalpy of input (for example feed water or air in kcal/kg or kcal/m3) entering the project equipment. For boilers, condensate return (if any) must be incorporated into enthalpy of the feed.	Applicable – The total rated thermal energy generation capacity of the project equipment i.e. the steam generating boiler has been calculated taking the difference between enthalpy of total output steam leaving the project boiler and the total enthalpy of feed water entering the project boiler.
<u>Footnote 3:</u> Co-fired system uses both fossil and renewable fuels.	Applicable to the project activity as in case of extreme exigency there may be co-firing of fossil fuel.
<u>Footnote 4:</u> Physically distinct units are those that are capable of producing thermal/electrical energy without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered .physically distinct..	Applicable- The project activity has dedicated boiler and turbine to generate steam and electricity therefore they are physically distinct and not directly affect the mechanical, thermal, or electrical characteristics of the existing facility.
<u>Footnote 5:</u> Refer to Annex 18, EB 23 for the definition of renewable biomass.	The project activity is using rice husk which is as per the Glossary of CDM Terms, point no. 4 of definition of Renewable Biomass (page 26 of Glossary of CDM terms Version 05) is a renewable biomass and not a charcoal based project.

Thus, the proposed project activity meets relevant requirements of the methodology as mentioned above and therefore the choice of project category is justified.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

The spatial extent of the project boundary encompasses:

According to paragraph 12 of the methodology, the project boundary has been defined as:

“The physical, geographical site of the project equipment producing the renewable energy delineates the project boundary. The boundary also extends to the industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment that is affected by the project activity.”.

The energy generation unit consists of boiler and turbine, electrical and instrumentation systems, water treatment plant and fuel feeding system and auxiliary equipment for the plant operation. The project boundary encompasses the textile mill where the generated steam and power is consumed.

Emission sources included in the project boundary:

The project participants have included in the project boundary, GHG emissions sources from the project activity and emission sources in the baseline. The project boundary includes the following emission sources:

	GHG sources	applicability	Reason
Baseline	CO2	Yes	Main emission sources related to power generated using fossil fuel in regional grid
	CH4	No	Excluded for conservativeness.
	N2O	No	Excluded for conservativeness
Project	CO2	Yes	Main emission source. As the project utilises biomass based cogeneration energy, there are no emissions associated with the same. In case of exigency there will be use of fossil fuel during project period and may cause CO2 emission.
	CH4	No	Excluded since there is no CH4emission associated with the technology
	N2O	No	Excluded since there is no N2O emission associated with the technology

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

Currently the textile unit imports power from PSEB which is part of the NEWNE regional electricity grid and generates steam for the process from a biomass fired 3TPH boiler. The power is required for the entire textile unit whereas the steam is required only for the yarn conditioning unit and the dying unit. There is an expansion of textile unit for which the power supply would have been met from the regional electricity grid only.

As per paragraph 15 of approved methodology AMS-I.C. version 18,

“Project activities producing both heat and electricity including cogeneration shall use one of the following baseline scenario”

- (a) Electricity is imported from the grid and steam/heat is produced using fossil fuel
- (b) Electricity is produced in an onsite captive power plant (with a possibility of export to the grid) and steam/heat is produced using fossil fuel
- (c) A combination of (a) and (b)
- (d) Electricity and steam/heat are produced in a cogeneration unit, using fossil fuel.
- (e) Electricity is imported from the grid and/or produced in an on-site captive power plant (with a possibility of export to the grid); steam/heat is produced from renewable biomass.
- (f) Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to the grid) and/or imported from the grid; steam/heat is produced using fossil fuel;
- (g) Electricity and thermal energy (steam/heat) are produced in a biomass fired cogeneration unit (without a possibility of export of electricity either to the grid or to other facilities and without a possibility of export of thermal energy to other facilities)7;
- (h) Electricity and/or thermal energy produced in a co-fired system.

In the pre-project scenario it has an operational history of grid power import and biomass based heat/steam generation which is in line with baseline option (e). Thus for the project activity the most likely baseline scenario is the electricity import from the grid and steam generation from biomass i.e. paragraph 15. (e) of the methodology AMS-I.C. Version 18.

As the project activity displaces grid electricity import and the baseline is the grid itself, so the baseline emission factor for the project activity can be calculated following paragraph 21 of the methodology AMS-I.C. Version 18 states that “For project activities that do not displace captive electricity generated by existing plant but displace grid electricity import and/or supply electricity to grid, the emission factor of the grid shall be calculated as per the procedures detailed in AMS-I.D.”

Now as per paragraph 11 of approved methodology AMS-I.D. version 16 the Baseline Emission can be calculated as follows:

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$$

Where:

BE_y = Baseline Emissions in year y; tCO₂e

$EG_{BL,y}$ = Quantity of net electricity supplied to the process plant as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{CO2,grid,y}$ = CO₂ emission factor of the NEWNE grid in year y - (tCO₂e/MWh)

The Emission Factor for the regional grid can be calculated in a transparent and conservative manner as per paragraph 12 of AMS.I.D, ver 16:

- (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the Emission Factor for an electricity system’. or
- (b) The weighted average emissions (in t CO₂/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Calculations shall be based on data from an official source (where available) and made publicly available.

The project proponent has opted the approach (a). The project participant has chosen combined margin (CM) approach for determination of the baseline emission factor of the project activity.

The emission factor has been estimated using the seven steps according to “Tool to calculate the emission factor for an electricity system” (Version -02, EB- 50) provided in section B.6.1

As heat/steam was already being generated by biomass in the baseline scenario, as per paragraph 28 of AMS-I.C., version18, emission reductions for thermal generation is not eligible. Thus the baseline emissions is calculated only for the corresponding net electricity generation by the project activity which would have been supplied by other power plants connected to the grid in the absence of the project activity.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

According to the Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities and paragraph 1 of Annex34, EB35:

“Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

- (a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions
- (b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions
- (c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions
- (d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher

The baseline scenario, which is continuation of grid supply without any new investment would be a financially more viable alternative to the project activity, which would have led to higher emissions. Thus, from the above directive, it can be said that the project activity faces investment barriers and same is being demonstrated in the following section.

Investment barrier:

As per applicable methodology, the guidance 16 of Annex 58, EB51 of UNFCCC-CDM, says “*If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate*”. Since the proposed baseline scenario is the supply of electricity from the grid, benchmark analysis has been chosen to demonstrate the additionality of the project. Having regard to the fact that the project is funded by a mix of debt and equity, project IRR is considered as an appropriate indicator. Annex 58 EB 51 permits use of project IRR as financial indicator and the project IRR is one of the financial indicators used by the banks to assess the investment worthiness of the project.

The project proponent has selected PLR, the commercial lending rate as the benchmark which is in conformity with the guidance 12 Annex 58 EB 51, as project IRR has been chosen as the financial indicator. At the time of decision making, the PLR was 10.25 – 10.75%⁴. PP has chosen 10.75% as the benchmark. Since the benchmark

⁴ Source: <http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/68241.pdf>

is publicly available and hence verifiable by DOE, the bench mark confirms to guidance 13 Annex 58 EB 51.

Following are the assumptions considered at the time of decision making:

Parameter	Value	Unit	Source
Project Cost			
Plant & Machinery	179.8	Million INR	Quotation from EPC contractor dated 2nd Dec, 2005
Building	50	Million INR	Estimation from Civil Engineer dated 9th Dec, 2005
IDC	8.77	Million INR	Calculated considering 7.5months construction period
Land	20	Million INR	Estimation from Civil Engineer dated 9th Dec, 2005
Total project cost	258.57	Million INR	Calculated
Financing Pattern			
Debt	181.00	Million INR	Andhra Pradesh Electricity Regulatory Commission Order dated 20th March, 2004 (http://www.aperc.gov.in/OtherOrders/Order_RP_84_2003.doc)
Equity	77.57	Million INR	
Terms of loan			
Actual interest rate	12.75	%	Loan Sanction letter dated 06th March, 2007
		installment in seven years	
Repayment	28		
Moratorium	12	Months	
TUFS	5	%	GOVERNMENT RESOLUTION ON TUFS ON TECHNO-OPERATIONAL PARAMETERS (http://www.txcindia.com/html/tufsbookletsection1.pdf)
Effective interest rate	7.75	%	
Installed capacity	6.5	MW	Quotation from EPC contractor dated 2nd Dec, 2005
No. of working days	350	days	Continuous plant with 15 days annual shut down
Hrs of operation in a day	24	hrs/day	
Auxiliary consumption	10	%	Quotation from EPC contractor dated 2nd Dec, 2005 and Andhra Pradesh Electricity Regulatory Commission Order dated 20th March, 2004 (http://www.aperc.gov.in/OtherOrders/Order

			RP_84_2003.doc)
CUF	85	%	Quotation from EPC contractor dated 2nd Dec, 2005
Gross power generation	46410	MWh	Calculated
Annual Net power generation	41769	MWh	Calculated
Tariff	4	Rs/kWh	Electricity bill for November 2005
Escalation in tariff	0.094	Rs/kWh	Grid power tariff history
Specific consumption of biomass in project plant for power generation	1.13	kg biomass /kWh gross power generated	"Biomass Consumption in Project" worksheet
Annual consumption of biomass in project boiler	52511	tonnes /annum	Calculated
Biomass cost	2000	Rs./Ton	Invoice raised by the biomass suppliers
Biomass cost escalation	5	%	Andhra Pradesh Electricity Regulatory Commission Order dated 20th March, 2004 (http://www.aperc.gov.in/OtherOrders/Order_RP_84_2003.doc)
Working Capital for biomass storage	2	months	
Working Capital for O & M	1	month	
Working capital (Promoters contribution)	25	% of total WC	WC loan sanction letter 09th Feb, 2005
Interest on Working capital loan	12.75	%	
O & M cost	12	Rs. million	Quotation for O & M dated 25th Nov, 2005
O & M cost escalation	5	%	
Rate of depreciation			
Depreciation on building	3.34	%	http://pdsarafco.com/Quick%20Info%20Link/Cos.%20Act/Schedule%20XIV%20-

Depreciation on plant & machinery	5.28	%	%20Rates%20Of%20Depreciation.htm
Depreciation on building as per IT Act	10	%	IT Rule old Appendix I
Depreciation on plant & machinery as per IT Act	80	%	
Tax rate (33.66%)	33.66	%	http://www.taxindiaonline.com/RC2/inside2.php3?filename=bnews_detail.php3&newsid=5638
Emission factor	0.84	tCO ₂ e/MWh	CEA data base version 05
VCU price	4	\$/VCU	-
Exchange rate	45	INR/\$	

Guidance 11 of Annex 58 EB 51 of UNFCCC-CDM states that in cases, where a post tax benchmark is applied the actual interest payable should be accounted in the calculation of Income Tax. Accordingly the interest rate stipulated in the sanction letter of the IDBI bank has been taken into consideration.

In this context it is stated that the financial indicator has been calculated for a period of 20 years, which is in confirmative with guidance 3 Annex 58 EB 51. The CUF is based on estimation by a third party engineering company contracted by the project developer, and therefore confirms to Annex 11 EB 48.

The salvage value has been taken as the residual value, namely the total investment cost less book depreciation provided during the 20Year period. In this context it is submitted that since 70% of the project cost has been subjected to accelerated depreciation, the salvage value represents the potential profit expected in the terminal year. Therefore the salvage value confirms to guidance 4 Annex 58 EB 51.

Based on the above, the project IRR works out to 7.99% which is below the benchmark and hence the project is not a business as usual scenario.

Sensitivity analysis

The conclusion that the project is additional has been tested by subjecting critical parameters to reasonable variations as required by Annex 58 EB 51 of UNFCCC-CDM. As per guideline provided at paragraph 17 of EB51 annex 58 of UNFCCC-CDM, the criterion for choosing the sensitivity analysis parameter is:

Guidance: Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets.

A sensitivity analysis on the project's financial returns has been performed with the variation in the following parameters selected following the above guidance:

1. CUF
2. Biomass price
3. O & M cost
4. Project cost

These parameters have been subjected to 10% variation on either side. The variation considered for sensitivity analysis is appropriate as there has been an over run in the project cost, biomass price has gone up even beyond 10% and the O & M cost contracted by the company as well as the escalation there on has been much more than what has been envisaged in the financial indicator calculation. The variation conforms to guidance 18 Annex 58 EB 51 of UNFCCC-CDM.

The results of the sensitivity analysis are given below:

Variable parameters	Variation		
	-10%	0%	10%
Project Cost	9.39%	7.99%	6.77%
CUF	4.95%	7.99%	11.00%
O & M Cost	9.18%	7.99%	6.72%
Fuel Cost	17.29%	7.99%	Negative

From the figures given above, it is evident that not only the project is additional, but would continue to remain additional even when the critical parameters are subjected to reasonable variations.

An analysis was also conducted to ascertain at what percentage variation in the critical parameters the project IRR would equal/breach the bench mark and the results of the analysis are as follows:

- a) When the project cost goes down by 18.5%
- b) When the CUF goes up by 9.2%
- c) When the O & M cost goes down by 24.3%
- d) When the fuel cost goes down by 2.5%

It is submitted that all the above conditions are hypothetical and unrealistic for the following reasons-

- a) The project has already experienced cost overrun and the cost incurred on the project is INR. 360.1 million which is evidenced by a chartered accountant. Therefore the question of the cost coming down is unrealistic.
- b) The CUF considered is based on third party estimation. The generation has been computed based on 350 days on operation while the biomass plants operate maximum 330 days in a year. Therefore an increase in the CUF by 9.2% would result in the plant operating at a capacity of more than 92.82% which has never been witnessed so far.
- c) The company has already signed an O & M agreement with M/s Triveni Engineering as per which the company has to pay O & M charges of INR. 0.94 Million per month plus INR. 0.1 Million per month resulting in an overall O & M cost of 1.04 Million per month. The O & M cost of INR. 0.94 Million is subject to an escalation at 10% per annum, while in the financial indicator calculation the escalation has been considered at 5% per annum.

- d) Fuel cost considered in the financial indicator calculation is not only based on the quotation/invoice but also substantiated by the Annual Report of the company. The company is at present paying more than INR 3000 per tonne which is also evidenced by the Annual Report. In the above back ground any reduction in biomass cost is unrealistic.

In the above back ground it is submitted that the project is not a Business as usual scenario. It is additional and would continue to remain additional irrespective of any changes in the critical parameters. It is in the above back ground that the registration of the project as VCS project activity deemed essential as the VCS revenue will be significant to make the project financially viable.

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

Title & Reference of the methodology

In line with the requirement for VCS 2007.1 and in reference to the UNFCCC CDM website, the approved monitoring methodology applied to the small-scale project activity is “AMS-I.C. “Thermal energy production with or without electricity”- Version 18.

AMS-I.C. is applicable to the project activity as because the project activity is a biomass based cogeneration project.

The methodology is used in its approved form and no deviation to methodology or revision to methodology is required for applying to the project activity.

Explanation of the methodology choice

As per the monitoring requirement of AMS I.C, version 18 paragraph 46 relevant monitoring parameters for the project activity are:

- Gross electricity generated by the project activity in the year y
- Auxiliary electricity consumed by the project activity in the year y
- Net electricity supplied by the project activity in the year y
- Quantity of biomass type i consumed in the project activity during the year y
- NCV of biomass used in the project activity
- Moisture of biomass used in the project activity
- Quantity of fossil fuel consumed in the project activity during the year y
- Net calorific value of fossil fuel consumed in the project activity during the year y
- Emission factor of fossil fuel consumed in the project activity during the year y

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

Purpose of monitoring

1. To estimate the total amount of baseline emission - for this net amount of power supplied to textile unit is required. The net electricity is calculated as the difference of the measured values of gross electricity generation and auxiliary electricity consumption. The distance between the textile unit and the power plant is within 100 meters and hence the transmission loss is negligible.
2. To estimate the total amount of project emission - for this the amount of fossil fuel consumed and its NCV and Emission factor are required to be monitored.

Types of data and information to be reported, including units of measurement:

Provided in below section 3.3

- **Origin of the data**

Provided in below section 3.3

- **Monitoring, including estimation, modelling, measurement or calculation approaches**

Provided in below section 4.1

- **Monitoring times and periods, considering the needs of intended users**

Provided in below section 3.3

- **Monitoring roles and responsibilities**

Provided in below section 3.4

- **Managing data quality**

Provided in below section 3.3

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data and parameters those are available at validation:

Data / Parameter:	Biomass surplus availability
Data unit:	%
Description:	Surplus biomass (rice husk) availability in the region
Source of data used:	Based on report from DSCL energy services company ltd in Oct, 2008
Value applied:	47.68
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is used from third party assessment report.
Any comment:	DSCL energy services company ltd is CRISIL-BEE accredited agency http://www.bee-india.nic.in/schemes/documents/ecbc/accredited_ESCOs

	.pdf
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Data / Parameter:	SEC_{ff}
Data unit:	TJ /MWh
Description:	Specific energy consumption of the cogeneration unit when fired with sub-bituminous coal
Source of data used:	Calculated from boiler efficiency with sub-bituminous coal and total steam enthalpy at boiler outlet.
Value applied:	Coal - 0.00424 (fixed <i>ex-ante</i>)
Justification of the choice of data or description of measurement methods and procedures actually applied :	The above value is calculated based on the 85% boiler efficiency (Tool to determine the baseline efficiency of thermal or electric energy generation systems, version 01) and the enthalpy of is taken from the steam tables for output steam at 66 ata pressure and 490degC temp. And feed water at 90 ata pressure and 105 degC temp.
Any comment:	Specific energy consumption of coal is fixed <i>ex-ante</i> .

Data / Parameter:	SEC_{biomass}
Data unit:	TJ /MWh
Description:	Specific energy consumption of boiler when fired with biomass (rice husk)
Source of data used:	Calculated from manufacturer supplied boiler efficiency with rice husk and total steam enthalpy at boiler outlet.
Value applied:	Rice husk - 0.00444 (fixed <i>ex-ante</i>)
Justification of the choice of data or description of measurement methods and procedures actually applied :	The above value is calculated based on the boiler efficiency (supplier specification) and the enthalpy of is taken from the steam tables for output steam at 66 ata pressure and 490degC temp. And feed water at 90 ata pressure and 105 degC temp.
Any comment:	Specific energy consumption of rice husk is fixed <i>ex-ante</i> .

Data and parameters monitored:

Data / Parameter:	EG_{gross,y}
Data unit:	MWh
Description:	Gross electricity generated by the project activity in the year y
Source of data to be used:	Plant log book/DCS record
Value of data applied for the purpose of calculating expected emission reductions	46,410 (Calculated ex-ante considering 350 days of operation at 85% CUF)
Description of	Measurement Method: Online continuous

measurement methods and procedures to be applied:	monitoring using the energy meters installed in the power plant. • Measurement Procedure and frequency: The data will be recorded on an hourly basis by electrical technician. There will be three shifts in a day and the data for the three shifts will then be summarised daily and will be consolidated on monthly basis. • Measuring Equipment: Energy Meter with 0.5 S accuracy installed within the project boundary • Calibration Process: Energy Meter duly calibrated by an independent accredited third party. • Calibration frequency: Once in three years • Responsible Entity: Management of GACL • Archiving Policy: Paper & Electronic.
QA/QC procedures to be applied:	The meter will be calibrated at least once in three year as per paragraph 17(c), annex 35, EB 55 by an independent accredited third party. The meter is under sealed conditions by the manufacturer.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

Data / Parameter:	EG_{aux,y}
Data unit:	MWh
Description:	Auxiliary electricity consumption during the year y
Source of data to be used:	Plant records (Log book)
Value of data applied for the purpose of calculating expected emission reductions	4,641 (Calculated ex-ante considering as 10% of gross generation)
Description of measurement methods and procedures to be applied:	• Measurement Method: Online continuous monitoring using the energy meters installed in the power plant. • Measurement Procedure and frequency: The data will be recorded on an hourly basis by electrical technician.

	There will be three shifts in a day and the data for the three shifts will then be summarised daily and will be consolidated on monthly basis. - Measuring Equipment: Energy Meter with 0.5 S accuracy installed within the project boundary - Calibration Process: Energy Meter duly calibrated by an independent accredited third party. - Calibration frequency: Once in three years - Responsible Entity: Management of GACL - Archiving Policy: Paper & Electronic.
QA/QC procedures to be applied:	The meter will be calibrated at least once in three year as per paragraph 17(c), annex 35, EB 55 by an independent accredited third party. The meter is under sealed conditions by the manufacturer.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

Data / Parameter:	EG_{BL,y}
Data unit:	MWh
Description:	The amount of net electricity supplied by the project activity during the year y
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions	41,769 (Calculated as EG _{gross,y} - EG _{aux,y})
Description of measurement methods and procedures to be applied:	- Measurement Method: Calculated as EG_{gross,y} - EG_{aux,y} - Measurement Procedure and frequency: Calculated monthly basis and consolidated annually. - Measuring Equipment: NA - Calibration Process: NA - Calibration frequency: NA - Responsible Entity: Management of GACL - Archiving Policy: Paper & Electronic.
QA/QC procedures to be applied:	Not applicable. Please refer details for EG _{gross,y} and EG _{aux,y}
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in

	both soft copy and hard copy format.
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Data / Parameter:	FC_{rice husk,y}
Data unit:	Tonne
Description:	Quantity of biomass type i consumed in the project activity during the year y
Source of data to be used:	Procurement data as maintained in the plant, data will be monitored on a monthly frequency.
Value of data applied for the purpose of calculating expected emission reductions	62,535 (Calculated considering rice husk as fuel and 350 days of power plant operation at 85% CUF)
Description of measurement methods and procedures to be applied:	• Measurement Method: Stock in/stock out method. • Measurement Procedure and frequency: The amount of biomass consumed during the year y will be consolidated from the difference of the opening stock, total biomass procured from weigh bridge records (as when purchased basis) and the balance stock recorded on monthly basis. • Measuring Equipment: in house Weigh Bridge for measuring the procurement quantity of accuracy $\pm 5\text{kg}$. • Calibration Process: As per weights and measurement act. • Calibration frequency: Once in a year. • Responsible Entity: Management of GACL • Archiving Policy: Paper & Electronic.
QA/QC procedures to be applied:	Data will be verified by the biomass purchase records and invoices.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

Data / Parameter:	FC_{coal,y}
Data unit:	Tonne
Description:	Quantity of sub-bituminous coal consumed in the project activity during the year y
Source of data to be used:	Procurement data
Value of data applied for the purpose of calculating expected emission reductions	0
Description of measurement methods and procedures to be applied:	• Measurement Method: Stock in/stock out method. • Measurement Procedure and frequency: The amount of sub-bituminous coal consumed during the year y will be consolidated from the difference of the opening stock,

	total coal procured from weigh bridge records (as when purchased basis) and the balance stock recorded on monthly basis. - Measuring Equipment: in house Weigh Bridge for measuring the procurement quantity of accuracy $\pm 5\text{kg}$. - Calibration Process: As per weights and measurement act. - Calibration frequency: Once in a year. - Responsible Entity: Management of GACL - Archiving Policy: Paper & Electronic.
QA/QC procedures to be applied:	Data will be verified by the sub-bituminous coal purchase records and invoices.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

Data / Parameter:	NCV_{coal,y}
Data unit:	TJ/tonne
Description:	Net calorific value of sub-bituminous coal consumed in the project activity during the year y
Source of data to be used:	Supplier data or in absence of which National/local or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories will be considered..
Value of data applied for the purpose of calculating expected emission reductions	Will be measured ex-post.
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Values will be verified whether they are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories will have ISO17025 accreditation or will comply with similar quality standards in case supplier or local data is being used.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

Data / Parameter:	EF_{CO₂,coal,y}
Data unit:	tCO ₂ e/TJ
Description:	Emission factor of sub-bituminous coal consumed in the project activity during the year y
Source of data to be used:	In absence local and supplier data IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories has been considered.
Value of data applied for the purpose of calculating expected emission reductions	100
Description of measurement methods and procedures to be applied:	Any future revision of the IPCC Guidelines will be taken into account.
QA/QC procedures to be applied:	As IPCC Guidelines is publicly available third party data, no QA/QC check is required.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

Data / Parameter:	NCV_{rice husk,y}
Data unit:	TJ/tonne
Description:	Net calorific value of biomass by type i consumed in the project activity during the year y
Source of data to be used:	Annual test report from NABL accredited lab.
Value of data applied for the purpose of calculating expected emission reductions	Will be measured ex-post.
Description of measurement methods and procedures to be applied:	Annual measurement in laboratories according to relevant national/international standards. NCV will be measured based on dry biomass.
QA/QC procedures to be applied:	Consistency of the measurements will be checked by comparing the measurement results with measurements from previous years. If the measurement results differ significantly from previous measurements or other relevant data sources, additional measurements will be conducted.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

Data / Parameter:	M_{rice husk,y}
Data unit:	% water
Description:	Moisture content of the biomass residues by type i in year y.
Source of data to be used:	On site lab test report.
Value of data applied for the purpose of calculating expected emission reductions	Will be measured ex-post.
Description of measurement methods and procedures to be applied:	• Measurement Method: In house lab test. • Measurement Procedure and frequency: The moisture content of biomass shall be monitored at least on a monthly basis. The weighted average would be calculated for each monitoring period and to be used in the calculations. • Measuring Equipment: In house lab equipment. • Calibration Process: Calibration of the electronic weigh scale (of accuracy $\pm 0.001\text{gm}$) used for moisture analysis will be done as per national standards. • Calibration frequency: Annually. • Responsible Entity: Management of GACL • Archiving Policy: Paper & Electronic.
QA/QC procedures to be applied:	As a QA/QC procedure, annual sampling will be done by third party accredited lab and highest value will be considered to calculate the dry quantity of biomass.
Any comment:	The data will be kept for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format.

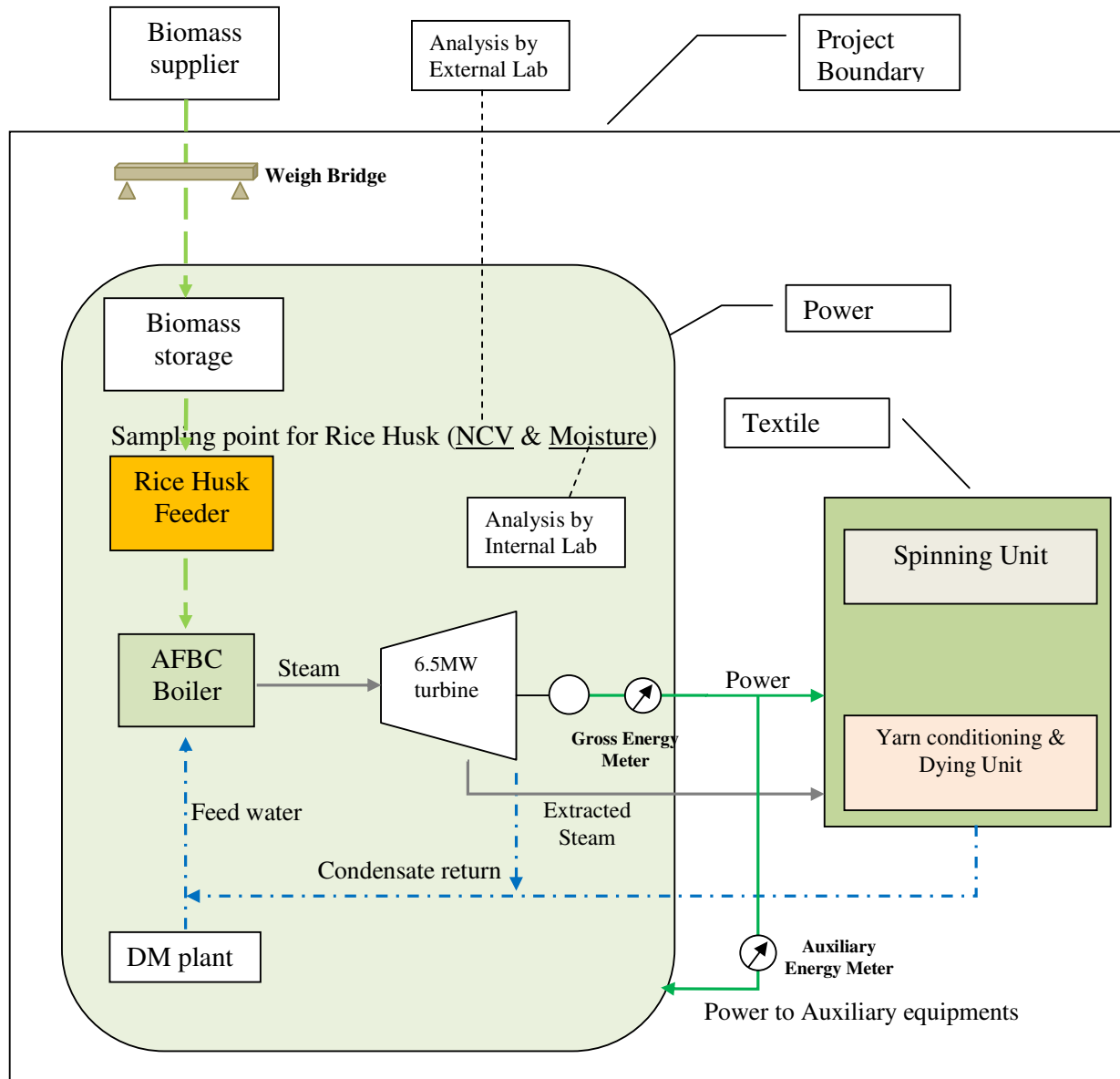
3.4 Description of the monitoring plan

The monitoring plan revolves around the monitoring electrical energy generation. The gross electricity generation and auxiliary electricity consumption will be monitored using energy meters installed in the power plant.

The monitoring will be done on a continuous basis and records (log books) would be maintained on an hourly basis. These records will then be collated at the end of every day by the power plant manager. The biomass and coal (if any) consumed in the project activity will be monitored in stock in stock out basis. Moisture would be measured in-house on monthly basis and NCV would be tested annually by NABL accredited external lab.

All the energy meters will be calibrated at least once in three year and Weigh Bridge will be calibrated at least once in a year to ensure their proper functioning. In case of any measuring equipment failure same will be replaced as soon as possible to avoid any loss of run data of the project plant.

Single Line Diagram showing biomass, water, steam and electricity within project boundary



	Biomass
	Water/condensate
	Steam
	Power
	Energy Meter

The monitored data will be kept in the plant for a minimum of two years after the end of crediting period or the last issuance of VCUs whichever occurs later. The data will be maintained in both soft copy and hard copy format. There will be internal audits to check the consistency of data and to take necessary corrective actions in case any data discrepancy. Training will be provided to the respective responsible persons for proper monitoring and data archiving.

The overall responsibility of the monitoring and reporting of the data will be with the Plant Head.

4 GHG Emission Reductions

4.1 Explanation of methodological choice:

Baseline Emission:

According to paragraph 17 of the Approved Methodology AMS IC version 18, Baseline emissions for supply of electricity to and/or displacement electricity from a grid shall be calculated as per the procedures detailed in AMS-I.D. Now as per paragraph 11 of approved methodology AMS-I.D. version 16 the Baseline Emission can be calculated as follows:

$$BE_y = EG_{BL,y} * EF_{CO_2}$$

$$= (EG_{gross,y} - EG_{aux,y}) * EF_{CO_2,grid,y}$$

Where,

BE_y = Baseline Emissions in year y; tCO₂e

$EG_{BL,y}$ = Energy baseline in year y; MWh

$EG_{gross,y}$ = Gross electricity generated by the project activity in the year y; MWh

$EG_{aux,y}$ = Auxiliary electricity consumption during the year y; MWh

$EF_{CO_2,grid,y} = EF_{grid,CM,y}$ = The CO₂ Emission Factor of the NEWNE grid in year y; tCO₂e/MW

The baseline emission factor has been calculated based on combined margin approach considering the data from “CO₂ Baseline Database” Version 5.0 published by CEA which is available at the time of preparation and webhosting of the PDD. The CO₂ Baseline Database published by CEA is in accordance with “Tool to Calculate the Emission Factor for an Electricity System” Version 01.1. However, the said tool is revised during EB 50 as Version 02 with addition of option to include off-grid power plants in the calculation of operating margin and build margin emission factor. As the revision in the tool is optional, the CO₂ Baseline Database, Version 5.0 is valid for calculation of emission factor.

Calculation of $EF_{CO_2, grid, y} = EF_{grid, CM, y}$ by using “Tool to calculate the emission factor for an electricity system” (Version -02, EB- 50) is provided below:

Step 1: Identify the relevant system:

The Central Electricity Authority, Ministry of Power, Government of India (Host Country) has given the delineations of the project electricity system and the connected electricity system in India. As per CEA, the Indian power system is divided into two regional grids, viz. NEWNE Grid & Southern Grid. Each grid covers several states as given in the following table. As the project activity is located in the State of Punjab, NEWNE Grid will be the relevant electricity system.

Geographical scope of the electricity generation system:

NEWNE Grid				Southern Grid
Northern	Eastern	Western	North-Eastern	Southern
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Andhra Pradesh
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Kerala
Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Tamilnadu
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Lakshadweep
Punjab	Andaman-Nicobar	Maharastra	Nagaland	
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional):

Option I (Only grid power plants are included in the calculation) is applicable as the grid system in India is very stable enough and off grid generation is not significant.

Step 3: Select a method to determine the operating margin (OM):

The calculation of the operating margin emission factor ($EF_{grid, OM, y}$) is based on one of the following methods:

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch data analysis OM, or
- (d) Average OM.

Out of the above options, the simple OM method (option a) is used in India. The Dispatch data analysis OM is not used as off-grid generation is not significant in India as per step 2 above. Other methods cannot currently be applied in India due to lack of necessary data.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- *Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation.*
- *Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.*

As per emission factor tool, the simple OM method (option a) can only be used if low- cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

In India as per available data (most recent five years) with CEA, the low-cost/must-run resources constitute 19.64% (NEWNE Grid) for which is less than 50% of total grid generation.

	Share of low cost / must run (% of net generation)⁵				
Year	2004-05	2005-06	2006-07	2007-08	2008-09
NEWNE grid	25.4%	18.0%	18.5%	19.0%	17.3%
Average of most recent four years (NEWNE grid)		19.64%			

Step 4: Calculate the operating margin emission factor according to the selected method:

The operating margin describes the average CO₂ intensity of the existing stations in the grid which are most likely to reduce their output if a CDM project supplies electricity to the grid (or reduces consumption of grid electricity). The simple operating margin is the weighted average emissions rate of all generation sources in the region except so-called low-cost or must-run sources. In India, hydro and nuclear stations qualify as low-cost / must run sources and are excluded. The operating margin, therefore, can be calculated by dividing the region's total CO₂ emissions by the net generation of all thermal stations. In other words, it represents the weighted average emissions rate of all thermal stations in the regional grid.

Simple Operating Margin:

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂e/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. The values of OM have been taken from CEA Database which has been calculated based on "Tool to calculate the emission factor for an electricity system". The value of simple operating margin emission factors is 1.004 tCO₂e/MWh (NEWNE Grid).

Year	Simple Operating Margin (OM)	Net Generation in Operating Margin (GWh)	Source of data
2006-07	1.008 tCO ₂ e/MWh	379470.598 GWh	CEA data base version 5.0 http://www.cea.nic.in/planning/c%20and%20e/government%20of%20india%20website.htm
2007-08	0.999 tCO ₂ e/MWh	401641.586 GWh	
2008-09	1.006 tCO ₂ e/MWh	421802.633 GWh	
	Weighted Average Operating Margin (OM)		
2008-09	1.004 tCO ₂ e/MWh		

⁵ http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver5.zip

Simple Operating Margin calculation has been done ex-ante and hence OM values will remain fixed and need not be monitored during the crediting period.

Step 5: Identify the group of power units to be included in the build margin (BM):

The sample group of power units m used to calculate the build margin consists of either:

- a) The set of five power units that have been built most recently, or
- b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation. Since in India, the installed capacity and corresponding annual generation from power plants is quite high, the sample group containing set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently comprise the sample group with the larger annual generation. Thus the sample group m consisting of option (b) is used for the estimation of build margin.

In terms of vintage of data, project participants have a choice to pick one of the two options provided.

Option 1 has been chosen wherein, for the first crediting period, the build margin emission factor is to be calculated ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation.

Step 6: Calculate the build margin emission factor:

The build margin emissions factor is the generation-weighted average emission factor (tCO₂e/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = (\sum_m EG_{m,y} * EF_{EL,m,y}) / \sum_m EG_{m,y}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y
(tCO₂e/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO2 emission factor of power unit m in year y (tCO₂e/MWh)
 m = Power units included in the build margin
 y = Most recent historical year for which power generation data is available.

Calculations for the Build Margin emission factor $EF_{grid,BM,y}$ is based on the most recent information available on the plants already built for sample group m at the time of PDD submission. The sample group m consists of the power plant capacity additions in the electricity system that comprise 20 % of the system generation and that have been built most recently.

As per CEA CO2 database, the latest available for the year 2008-09 is

Build Margin	Values	Source
2008 - 09	0.675 tCO ₂ e/MWh	CEA CO2 Data base, Version 5

Step 7: Calculate the combined margin emission factor:

The combined margin is a weighted average of the simple operating margin and the build margin. The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$$

$EF_{grid,CM,y}$ = Combined margin emission factor in year y
 (tCO₂e/MWh)

$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y
 (tCO₂e/MWh)

W_{OM} = Weighting of operating margin emissions factor (%)

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y
 (tCO₂e/MWh)

W_{BM} = Weighting of build margin emissions factor (%)

The default values used for biomass based power plants are $W_{OM} = 0.5$ and $W_{BM} = 0.5$

Hence the combined margin is calculated as follows and it will be fixed ex-ante for the entire crediting period:

$$\begin{aligned}
 EF_{grid,CM,y} &= EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM} \\
 &= (0.5 * 1.004) + (0.5 * 0.675) \\
 &= 0.839 \text{ tCO}_2\text{e/MWh} \\
 &= EF_{CO2,grid,y}
 \end{aligned}$$

Combined Margin for the project activity	Values	Source
	0.839 tCO ₂ e/MWh	Calculated

The above value of $EF_{CO2,grid,y}$ is fixed ex ante thought the monitoring period.

Project Emission:

The project activity emission sources as per the small scale methodology AMS- IC (paragraph 43) and their relevance with respect to the proposed CDM project activity are given below in a tabular format.

Source of project activity emission	Relevance with respect to the proposed
CO2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”	Applicable: Fossil fuel (coal) may be consumed in case of emergencies or during raining seasons.
CO2 emissions from electricity consumption by the project activity using the latest version of “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”	Not applicable as paragraph 2 on page 2 of this tool specified that it is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage”. As this project activity is using technology of captive renewable power generation.
Any other significant emissions associated with project activity within the project boundary	Not applicable as there are no other significant emissions associated with project activity within the project boundary.

For geothermal project activities, project participants shall account for the following emission sources, where applicable: fugitive emissions of carbon dioxide and methane due to release of non-condensable gases from produced steam; and, carbon dioxide emissions resulting from combustion of fossil fuels related to the operation of the geothermal power plant	Not applicable as this is biomass based co-generation project, not a geothermal project activity.
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Project emissions:

The onsite combustion of fossil fuels is required to be accounted. This is done by using latest version of “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” as follows:

$$PE_y = PE_{FC,y} = \sum_i FC_{i,y} \times COEF_{i,y}$$

Where:

- $PE_{FC,y}$ = CO2 emissions from fossil fuel combustion during the year y (tCO₂e/yr);
- $FC_{i,y}$ = Quantity of fossil fuel type i combusted during the year y (tons/yr);
- $COEF_{i,y}$ = CO₂ emission coefficient of fossil fuel type i in year y (tCO₂e/ton);
- i = Fossil fuel types combusted during the year y.

The CO₂ emission coefficient $COEF_{i,y}$ can be calculated using one of the following two Options, depending on the availability of data on the fossil fuel type i, as follows:

Option A:

The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on the chemical composition of the fossil fuel type i, using the following approach:

If $FC_{i,j,y}$ is measured in a mass unit:

$$COEF_{i,y} = w_{i,y} \times 44/12 \quad (2)$$

If $FC_{i,j,y}$ is measured in a volume unit:

$$COEF_{i,y} = w_{i,y} \times \rho_{i,y} \times 44/12 \quad (3)$$

Where:

- $COEF_{i,y}$ = CO₂ emission coefficient of fuel type i (tCO₂e/mass or volume unit);
- $w_{i,y}$ = Weighted average mass fraction of carbon in fuel type i in year y (tC/mass unit of the fuel);
- $\rho_{i,y}$ = Weighted average density of fuel type i in year y (mass unit/volume unit of the fuel)
- i = Fuel types combusted in process j during the year y

Option B:

The CO₂ emission coefficient COEF_{i,y} is calculated based on net calorific value and CO₂ emission factor of the fuel type i, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO_2,i,y} \quad (4)$$

Where:

COEF _{i,y}	=	CO ₂ emission coefficient of fuel type i in year y (tCO ₂ e/mass or volume unit)
NCV _{i,y}	=	Net calorific value of the fuel type i in year y (TJ/mass or volume unit)
EF _{CO₂,i,y}	=	Emission factor of fuel type i consumed in the project activity in year y (tCO ₂ e/TJ)
i	=	Fuel types combusted in process j during the year y

As per the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” the preferred approach to calculate CO₂ emission coefficient COEF_{i,y} should be Option A where necessary data is available. But due to lack of necessary data availability Option B has been adopted.

So,

$$PE_y = FC_{i,y} * NCV_{i,y} * EF_{CO_2,i,y} \quad (5)$$

Where:

Standard parameter	Customised Parameter for project activity	Description
FC _{i,y} =	FC _{coal,y} =	Quantity of fossil fuel type i combusted during the year y (tons/yr)
NCV _{i,y} =	NCV _{coal,y} =	Net calorific value of sub-bituminous coal in year y (TJ/tonne)
EF _{CO₂,i,y} =	EF _{CO₂,coal,y} =	CO ₂ emission factor of sub-bituminous coal in year y (tCO ₂ e/TJ)
i =	Coal =	Type of fossil fuel for the project activity which is sub-bituminous coal combusted in project activity during the year y

Leakage: LE_y

As per paragraph 45 of AMS-I.C., version 18, “If the energy generating equipment currently being utilised is transferred from boundary to the project activity, leakage is to be considered.”. For this project activity there is no transfer of equipment and therefore leakage due to equipment transfer has been taken to be zero.

As per paragraph 18 of Attachment C to Appendix B version 3 “General guidance on leakage in biomass project activities” - The project participant shall evaluate ex ante if there is a surplus of the biomass in the region of the project activity, which is not utilised. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in

the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

In line with this guidance on leakage associated with the use of biomass material for project activities, it is demonstrated through survey/biomass availability study⁶ conducted by DSCL energy services company ltd in Oct, 2008, within a distance of max. 50 km radius around the project site, that the biomass available in the region is around 51.26% surplus than the quantity of biomass that is utilised including the project activity.

The districts which have been covered are given below along with the surplus availability of rice husk.

Sl. No.	Parameters	Unit	Value
1	Total generation of rice husk(X)	MT	371,241
2	Consumption of rice husk in Industry(y)	MT	151,716
3	Rice mill Self Consumption @10% of Rice Husk Production(z)	MT	37,124.1
4	Consumption of rice husk in the project activity(A)	MT	62,535
5	Total Consumption of Rice Husk(B)	MT	251,375
6	Surplus rice husk in Catchment Area(X- B)	MT	119,866
7	Surplus %	%	47.68

Since the surplus quantity of rice husk is 47.68%, which is more than 25% as required by the guidance in Attachment C to Appendix B, the leakage associated with competing use of biomass is neglected.

The other source of Leakage is emissions associated with the transportation of biomass material to the project plant.

As per paragraph 46 of AMS-I.C., version 18, “In case collection/processing/transportation of biomass residues is outside the project boundary, CO₂ emissions from collection/processing/transportation of biomass residues to the project site should be considered”. GACL purchase rice husk from outside of the project boundary. So, the leakage applicable for this project activity will be due to transportation of biomass residues to project site. Now as per footnote

⁶ Ref: “Biomass Assessment Report for M/s. Gillanders Arbuthnot & Co. Ltd Sangrur District, Punjab.” prepared by DSCL energy services company ltd in Oct, 2008

11 of AMS-I.C. “If biomass residues are transported over a distance of more than 200 kilometers due to the implementation of the project activity then this leakage source attributed to transportation shall be considered, otherwise it can be neglected.”

For ex ante estimation, leakage emission would be considered zero, based on the biomass surplus availability report, which proves biomass is available in plenty within a distance of 200 Km radius around the project site. However, for ex post calculation, emission due to biomass transportation would be monitored. In case the average distance for biomass transportation is lower than 200 Km the same would be neglected.

The emission reductions can therefore be given as:

Emission Reduction: ER_y

The emission reduction due to project activity in the year y is the difference between the baseline emissions (BE_y), project emission (PE_y) thus

$$ER_y = BE_y - PE_y - LE_y$$

$$= (EG_{BL,y} * EF_{CO_2,grid,y}) - (FC_{i,y} * NCV_{i,y} * EF_{CO_2,i,y}) - LE_y$$

Where

ER_y	= Emission reduction during the year y, tCO ₂ e
BE_y	= Base line emission during the year y, tCO ₂ e
PE_y	= Project emission during the year y, tCO ₂ e
LE_y	= Leakage emission during the year y, tCO ₂ e
$EG_{BL,y}$	= Quantity of net electricity supplied to the process plant as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO_2,grid,y}$	= CO ₂ emission factor of the NEWNE grid in year y -(tCO ₂ e/MWh)
$FC_{i,y}$	= Quantity of fossil fuel type i combusted during the year y (tons/yr)
$NCV_{i,y}$	= Net calorific value of the fuel type i consumed in the project activity in year y (TJ/ton)
$EF_{CO_2,i,y}$	= Emission factor of fuel type i consumed in the project activity in year y (tCO ₂ e/TJ)
i	= Are the fuel types combusted during the year y

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

Baseline Emission:

The Baseline Emission is calculated with 350 days of 24 hours operation⁷ with 85% Capacity Utilization Factor (CUF)⁸. There is 10% auxiliary consumption⁹ of generated power in the plant. Therefore, the net electricity generation will be as follows:

$$\begin{aligned} EG_{BL,y} &= \text{Capacity of the project plant} * \text{days of operation} * \text{hours of operation per day} * (1 - \% \text{Auxiliary consumption}) * \text{CUF\%} \\ &= 6.5 \text{ MWh} * 350 \text{ days/year} * 24 \text{ hrs/day} * (1 - 10\%) * 85\% \\ &= 41,769 \text{ MWh/year} \end{aligned}$$

Hence, Baseline Emission is

$$\begin{aligned} BE_y &= 41,769 \text{ MWh/year} * 0.839 \text{ tCO}_2\text{e/MWh} \\ &= 35,044 \text{ tCO}_2\text{e/year} \end{aligned}$$

4.3 Quantifying GHG emissions and/or removals for the project:

Project Emission:

As discussed in section B.6.1, the project emission can be calculated based on net calorific value and CO₂ emission factor of the fuel type i, as follows:

$$PE_y = FC_{i,y} * NCV_{i,y} * EF_{CO_2,i,y} \quad (5)$$

Presently GACL has no intention to fire fossil fuel (coal) and neither have the fuel preparation (coal crusher) equipment in place.

So, for emission reduction ex-ante estimation,

$$PE_y = 0$$

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

Therefore Emission Reduction is,

$$\begin{aligned} ER_y &= BE_y - PE_y - LE_y \\ &= (35,044 - 0 - 0) \text{ tCO}_2\text{e/year} \\ &= 35,044 \text{ tCO}_2\text{e/year} \end{aligned}$$

⁷ Continuous plant with 15 days annual shut down

⁸ Source of data: Quotation from EPC contractor dated 2nd Dec, 2005

⁹ Source of data: Andhra Pradesh Electricity Regulatory Commission Order dated 20th March, 2004 (http://www.aperc.gov.in/OtherOrders/Order_RP_84_2003.doc)

Year		Estimation of project activity emissions tCO ₂ e	Estimation of baseline emissions tCO ₂ e	Estimation of leakage tCO ₂ e	Estimation of overall emission reductions tCO ₂ e
30/03/2009	-	0	35,044	0	35,044
29/03/2010	-	0	35,044	0	35,044
30/03/2010	-	0	35,044	0	35,044
29/03/2011	-	0	35,044	0	35,044
30/03/2011	-	0	35,044	0	35,044
29/03/2012	-	0	35,044	0	35,044
30/03/2012	-	0	35,044	0	35,044
29/03/2013	-	0	35,044	0	35,044
30/03/2013	-	0	35,044	0	35,044
29/03/2014	-	0	35,044	0	35,044
30/03/2014	-	0	35,044	0	35,044
29/03/2015	-	0	35,044	0	35,044
30/03/2015	-	0	35,044	0	35,044
29/03/2016	-	0	35,044	0	35,044
30/03/2016	-	0	35,044	0	35,044
29/03/2017	-	0	35,044	0	35,044
30/03/2017	-	0	35,044	0	35,044
29/03/2018	-	0	35,044	0	35,044
30/03/2018	-	0	35,044	0	35,044
29/03/2019	-	0	35,044	0	35,044
Total (tCO₂e)		0	3,50,440	0	3,50,440

5 Environmental Impact:

The Central Pollution Control Board requested the project participant to perform an Environmental Impact Assessment, therefore the EIA study has been conducted for the project activity. The reference number is SEIAA/2008/24976. The clearance is obtained from State Level Environment Impact Assessment Authority, Punjab, Government of India, Ministry of Environment and Forest.

The EIA was conducted by M/s EST Consultants (P) Ltd. and environmental impacts are not considered significant.

6 Stakeholders' comments:

The stakeholders identified for the project activity are as under:

1. Own employees
2. Local Populations

3. Statutory Bodies
4. Equipment suppliers

The comments were invited by conducting a stakeholder consultation meeting in the plant premises. Invitation letters were sent to local gram panchayat (Akbarpur), Local Municipal committee and the Punjab Pollution Control Board on 28/11/2008. The meeting was conducted on 12/12/2008.

Following comments were raised during stakeholder consultation meeting:

Comment No.	Raised by	Comment	Response by PP
1.	Local Businessman Mr. Mohan Lal.	As the project activity will be utilizing ground water for boiler operation, local people raised concerns about change in ground water level.	It was clarified that bulk of the water will be taken only during the boiler startup and once the boiler is operating, only make up water will be taken from the ground. This therefore minimizes the impact of project on the water level. Further to take care of the problem the company is also implementing rain water harvesting. Furthermore, the company will be utilizing ground water within permission from Central ground water authority. All the participants were fully satisfied with the response and commended the company on their initiative to harvest rain water.
2.	Local Shop worker Mr Hakam Din.	What would happen to the ash generated from the boiler?	It was clarified that the ash generated from the boiler will be land filled in a specific site owned by the company near the project site. Therefore there would not be any impact due to ash generation to the local surrounding.

7 Schedule:

Frequency of monitoring and reporting:

The details of frequency of monitoring and reporting are included in Section 3.4 in detail.

Project period:

Crediting period – 10 years

Crediting period start – 30 March 2009

Lifetime of the project activity – 25 years¹⁰

GHG project cycle:

The following are important project activities in the GHG cycle for this project activity:

Project Trail	Date
Board resolution for project approval consideration	16th December, 2005
Joint offer for consultation from IDBI and Mitcon consultancy	12th October, 2006
Negotiation with IDBI	07th December, 2006
Revised joint offer from MITCON and IDBI	05th January, 2007
Revised LOI with IDBI	12th April, 2007
Acceptance of LOI by IDBI	04th September, 2007
Invitation of stake holders meeting at factory premises	28th November, 2008
Stakeholders meeting	12th December, 2008
Start of commercial operation (COD)	30th March, 2009
Termination of contract of IDBI/MITCON as CDM advisors from GACL	01st June, 2009
LoU with First Climate (India) Pvt. Ltd. for CDM advisory services	19th June, 2009
Appointment of DOE	27th November, 2009
Date of receiving HCA	12th January, 2010

8 Ownership:

8.1 Proof of Title:

Proof of title in respect of rights of use accorded to the project proponent are:

¹⁰ Ref: Page 4 of “[Tool to determine the remaining lifetime of equipment](#)” EB 50, Annex 15

- Ownership of land that is proven by land purchase deeds.
- Purchase orders issued for acquiring the equipment i.e. Boiler and Turbine.

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

Not Applicable
