CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

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>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

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

>>

Renewable biomass residue based steam generation at Arvind Mills, Santej.

Version 03

18/06/2007

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

>>

The Arvind Mills Limited (AML) is India's well known textile manufacturing organization and is a part of "The Lalbhai Group". The textile manufacturing unit and the project activity is located at Santej, Gujarat. The activity implemented by AML is an eco-friendly initiative under Kyoto protocol climate change initiative at Santej, Gujarat, India.

The purpose of the project activity is to utilize available renewable biomass residues effectively for process steam generation and displace/avoid fossil fuel usage. The project activity is Fluidised Bed Combustion (FBC) boiler to generate process steam. The steam generated is utilized for in-house consumption alone. The capacity of FBC technology based boiler is 13 TPH and utilizes biomass residues available. Biomass residues are agriculture crop residues. In the project activity of AML current biomass residue utilized is De-oiled Castor Cakes (DOC). However the FBC system is designed to utilize other renewable biomass residues for steam generation.

The project proponent has identified and developed biomass supplier to avail the annual biomass residue requirement[1]. This ensures AML biomass residue availability on a continuous basis. Therefore, project activity contributes to the sustainability for AML as well as in Santej village. The initiative reduces GHG emissions and conserves environment.

The GHG abatement project activity developed under Clean Development Mechanism are required to assist Host Country in achieving sustainable development. Social, Economic, Environment and Technology are four pillars of sustainable development that have been considered while determining the project activity's contribution towards sustainable development. These sustainable development indicators are discussed below:

Social well being:

The project activity avoids usage of fossil fuel with renewable biomass residue which is sourced from local biomass supplier. AML has made a contract with the biomass supplier for annual required quantity in the project activity. Thus, the project activity creates additional revenues for farmers, biomass residue supplier and local villagers. Fly-ash generated from biomass residue combustion is taken by Brick manufacturers to use in there process. This helps AML to manage the fly-ash generated in a constructive way. The project activity therefore is found socially beneficial and promotes sustainable development.

Economical well being:

The project activity has opened up new business opportunities for local villagers, local labour contractors, biomass suppliers and brick manufacturers, which increase income generation for different people who are directly or indirectly connected with the project activity. The project certainly has benefited in improving the economic wellbeing.

Environmental well being:

The project activity utilizes renewable biomass residues and avoids fossil fuel usage. This helps direct GHG emission reduction. Further due to avoidance of fossil fuel, SO_X NO_X and Suspended Particulate matter (SPM) emissions will reduce significantly. Efficient combustion and air pollution control devices reduce particulate pollutants well below permissible limits of the Gujarat State Pollution Control Board (GPCB)[2]. Thus the activity implemented is environment friendly initiative by AML.

Technological well being:

The technology used in the project activity is FBC boiler technology which utilizes biomass residues efficiently. The measure efficiently combusts the fuel at low furnace temperature preventing NO_X emissions. The technology ensures complete combustion of biomass residues by through mixing of fuel with hot air and intimate contact with bubbling hot sand bed in FBC, this also reduces fly ash generation. Therefore promotes technological well being.

---

[1] Contract for biomass residue supply with the biomass supplier is made by AML and is renewed every year.

[2] Government approved third party stack and ambient monitoring is a routine activity at AML. Test certificates along with Environment clearance certificate from GPCB has been submitted to the validator.

Therefore, the project helps "Host Country" ***India*** to fulfill its goals of promoting sustainable development.

A.3. Project participants:

>>

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	The Arvind Mills Ltd (AML) (Private entity)	No

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

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

>>
India

A.4.1.1. Host Party(ies):

>>
India

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

>>
Gujarat

A.4.1.3. City/Town/Community etc:

>>
Santej

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

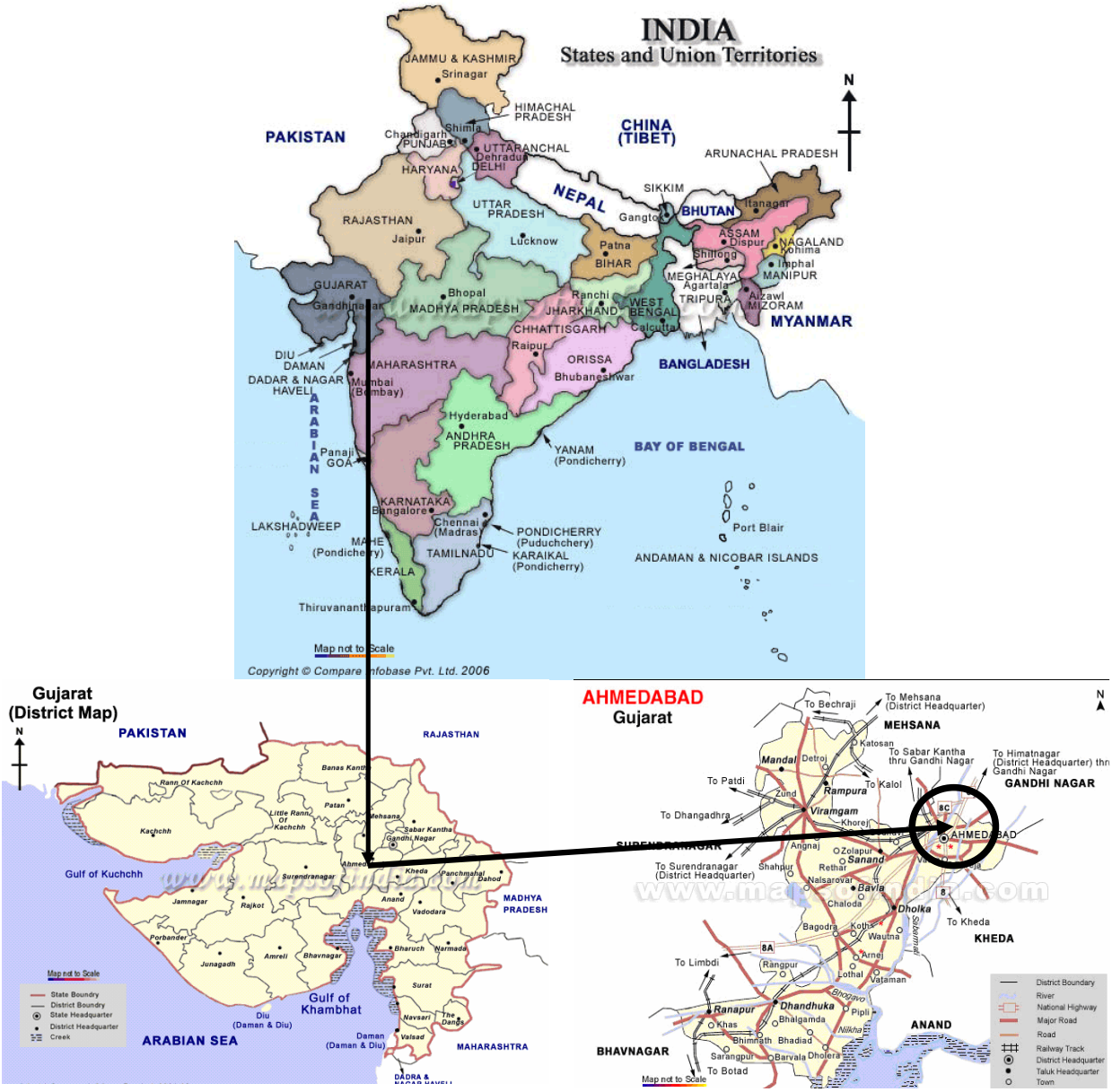
>>
The small scale project activity is located in Santej, which is 30 kms from Ahmedabad city. Typical geographical pointers which provide unique details of the project activity are given below:

GEOGRAPHICAL LOCATION

Latitude	23.1 degree N
Longitude	72.6 degree E
Height above MSL	55 m
Nearest Highway	NH-8 -12 Km from project activity
Nearest Railway station	Kalol- 15 kms from the project activity

Nearest Airport	Ahmedabad Airport - 30 kms from project activity

Postal Address:
The Arvind Mills Ltd (AML).
P.O Khatraj, Tal. Kalol, District: Gandhinagar,
Pin-382 721, Gujarat, India,
Tel: 91-2764-281100 , Fax: 91-2764-281098



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

>>

As per 'Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories', the project activity falls under the

Main Category: Type I - Renewable Energy Projects

Sub Category: "C" Thermal energy for the user

The project activity meets all the applicability criteria of small-scale CDM project activity category under Type-I: Renewable Energy Projects (C. Thermal energy for the user) of the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

The technology was implemented by M/s Cethar Vessels. The boiler is designed to utilize any biomass residue for process steam generation. Annual biomass residue requirement is approximately 20000 MT. Biomass residue (DOC) is currently obtained from biomass supplier (Ardip Agencies) who in turn procures DOC from N.K.Industries which is Castor Oil industry. AML every year makes contract for quantity required for continuous steam generation. For surplus biomass availability and sustainability of the project activity, a biomass assessment has been carried out to understand surplus availability of biomass and demand supply of biomass residues in the region.

Technology:

The project technology implemented is Fluidized Bed Combustion (FBC) system which consists of a furnace and boiler. The furnace is made of sand bed which continuously bubbled with air. Pre shred biomass residue is screened to size of 1 – 6 mm for complete combustion and low fly ash formation. The FBC system consists of the fuel feeder, fuel hopper, air distributor, Sand bed and heat transfer surface, boiler drum and the ash handling system. The rated capacity of the FBC boiler is 13 TPH at a design pressure of 14.5 kg/cm^2, however the boiler operate at 11.5 kg/cm^2. Atmospheric air, which acts as both the fluidization air and combustion air, is delivered at high flows through the bed after being preheated by the exhaust flue gases. FBC boiler bed temperatures ranges between 700-900˚C which ensures complete combustion of biomass residues. The flue gases generated are finally treated through two cyclones, which reduce SPM lower than the GPCB permissible limits. Low furnace temperatures prevent NO_x formation.

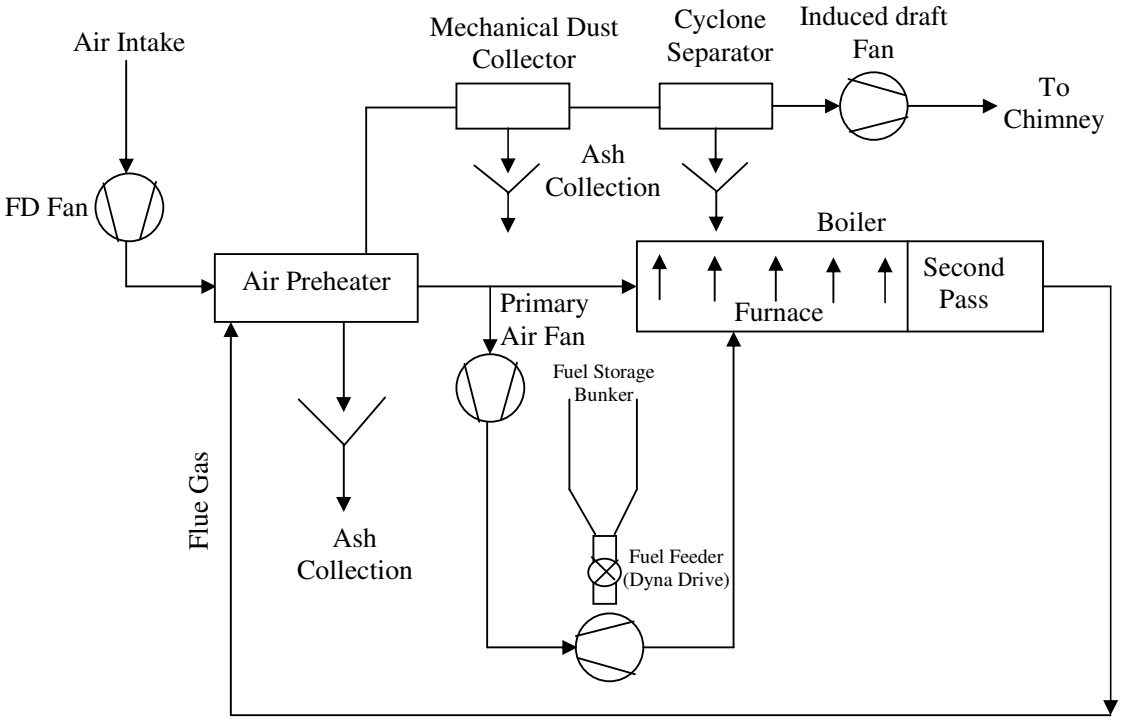


Fig A.4.2 (b): Process Flow Diagram at AML project

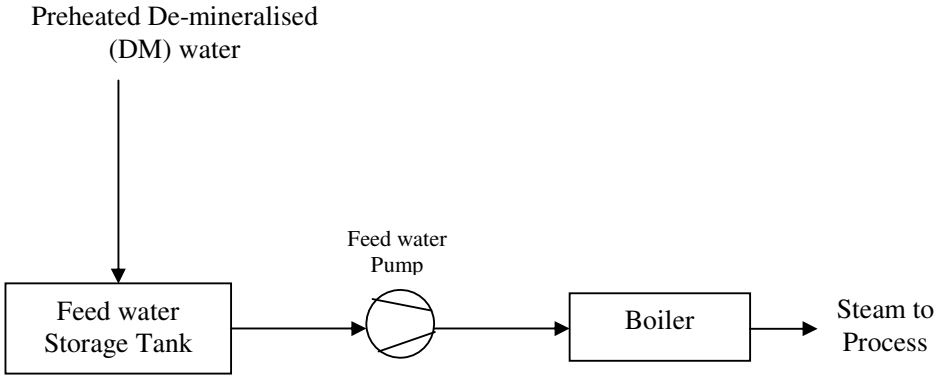


Fig A.4.2 (b): Process Steam Flow Diagram at AML project activity.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

>>

Years	Annual estimation of emission reductions in (tonnes of CO_2 e)
2007-08	32,055
2008-09	32,055
2009-10	32,055
2010-11	32,055
2011-12	32,055
2012-13	32,055
2013-14	32,055
2014-15	32,055
2015-16	32,055
2016-17	32,055
Total Estimated Reductions (tonnes of CO_2 e)	**3,20,550**
Total no of crediting period	10 years
Annual average over the crediting period of estimated reduction (tonnes of CO_2 e)	**32,055**

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

>>

No public funding is available in this project activity from Annex 1, countries of UNFCCC.

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

According to appendix C of simplified modalities and procedures for small-scale CDM project activities, 'debundling' is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities.

According to para 2 of appendix C[3]

A small-scale project activity shall be deemed to be a de-bundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

[3] Appendix C to the simplified M&P for the small-scale CDM project activities, http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point

The project activity under discussion is the first climate change initiative developed under Clean Development Mechanism. There is no similar project technology implemented in the vicinity or within 1 km radius of the project boundary at AML, Santej. Therefore the project activity is not a de-bundled component of a large project activity and has been considered under the small scale category.

SECTION B. Application of a baseline and monitoring methodology

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

>>

Title: *I. –"Renewable energy projects" C -"Thermal energy for the user"*

Reference: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities, Version 09, 23 December 2006.

B.2 Justification of the choice of the project category:

>>

Justification for the choice of small scale methodology AMS I.C is because of following technology /measure considered in the project activity

Paragraph 1: *"comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels"*

Justification 1: The project activity implemented at AML is a thermal energy (steam) technology which utilizes biomass residues renewable in nature and displaces fossil fuel usage. This qualifies the main measure taken.

Paragraph 2: Where generation capacity is specified by the manufacturer, it shall be less than 15MW.

Justification 2: The project activity of AML is designed for total thermal energy output of 11.4 MW equivalent which less than specified limit of 15 MW and therefore qualifies the applicability criteria.

Paragraph 3: For co-generation systems and/or co-fired systems to qualify under this category, the energy output shall not exceed 45 $MW_{thermal}$. E.g., for a biomass based co-generating system the capacity for all the boilers affected by the project activity combined shall not exceed 45 $MW_{thermal}$. In the case of the co-fired system the installed capacity (specified for fossil fuel use) for each boiler affected by the project activity combined shall not exceed 45 $MW_{thermal}$.

Justification 3: The project activity is neither a co-generation nor co-firing system, therefore not applicable in the case of AML project activity.

Paragraph 4: In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the added capacity of the units added by the project should be lower than 45 $MW_{thermal}$ and should be physically distinct[4] from the existing units.

Justification 4: The project activity is not an addition to the existing capacity, therefore not applicable to AML project activity.

As stated above, the project activity under consideration meets applicability conditions of the Category I.C. This justifies the appropriateness of the choice of the methodology in view of the project activity and its certainty in leading to a transparent and conservative estimate of the emission reductions directly attributed to the project activity. Therefore the baseline and emission reductions calculations from the project would be based on paragraph 6 of I.C. of Appendix B. The monitoring methodology would be based on the guidance provided in the paragraph 11 (a) of I.C. of Appendix B.Leakage calculations is based on paragraph 10 and is neglected as the equipment is not transferred.

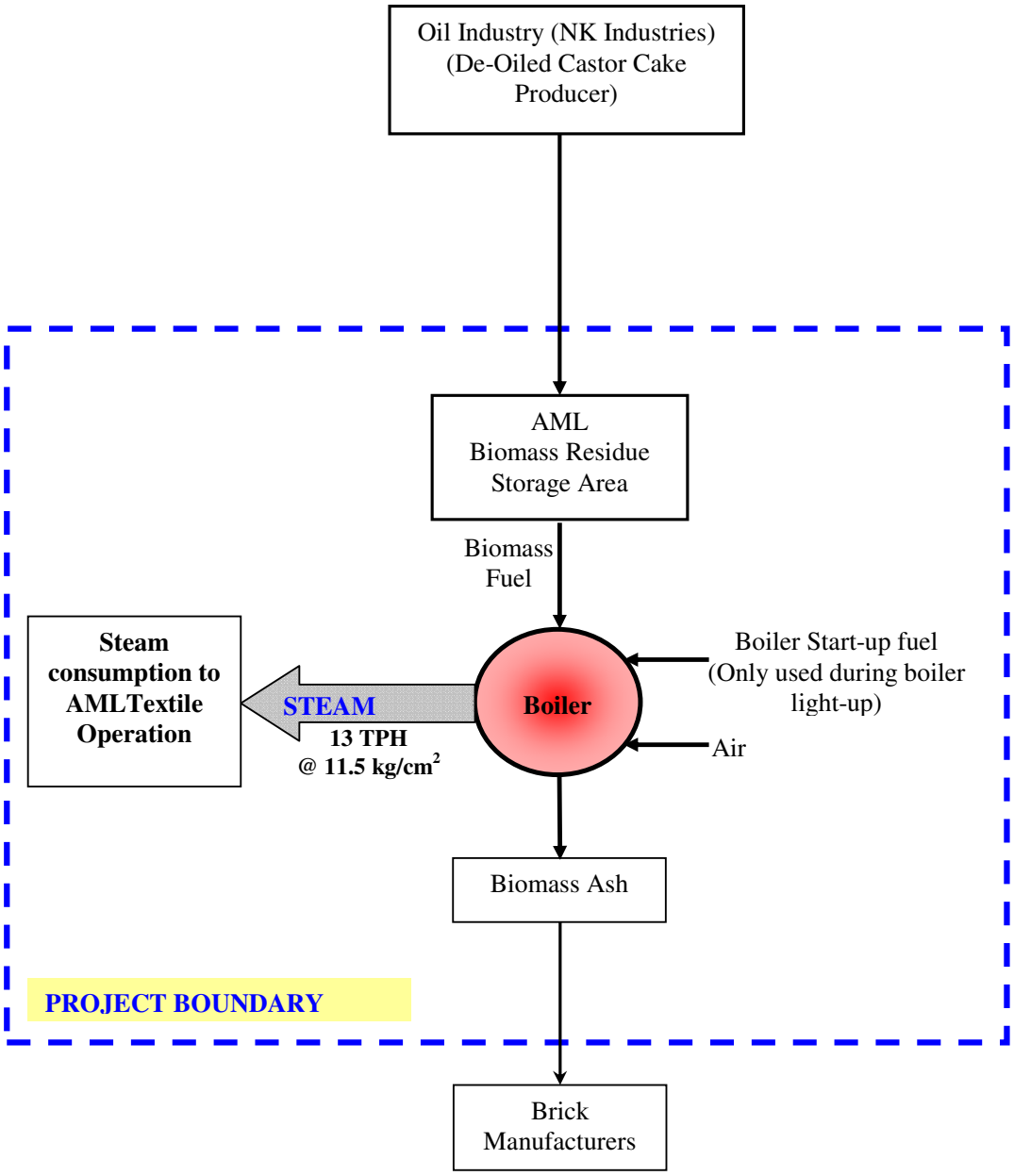
B.3. Description of the project boundary:

>>

As per AMS I.C project boundary is defined as "*The physical, geographical site of the renewable energy generation delineates the project boundary*". The project activity boundary included biomass supplier to the point of thermal energy (steam) generation. This is depicted in the Figure B.3 for better understanding to the readers. The steam is utilized for captive usage of AML which is ultimately used in textile manufacturing. Thus, boundary covers biomass supplier, fuel storage, furnace, boiler and textile units. The project participant does not need to account potential CH_4 emissions from the storage of biomass because they are considered to be very small if the stored in piles outside the plant area for no longer than one year.

[4] Physically distinct units are those that are capable of producing thermal 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".

Figure B.3: Project activity project boundary.



B.4. Description of baseline and its development:

>>

The baseline and its development have been carried out on the basis of criteria's provided as per AMS I.C/version 09, 23 December 2006. The project proponent has identified plausible project options for baseline scenario, which include all possible courses of actions that could be adopted in order to generate steam.

Further an assessment was conducted for each alternative to project activity with respect to the risks/barriers associated to implementation. The energy baseline was determined, which consists of the facility that would otherwise be built. The performance of the project activity and its associated emission reductions were evaluated with respect to the energy baseline scenario. Following are different alternatives which were assessed for determining baseline scenario at AML, Santej:

Alternative 1- Furnace Oil based steam generation

In absence of CDM project activity, AML could have generated process steam using Furnace Oil as fuel, to meet its steam requirement. However this alternative would not be a credible and realistic alternative available with AML as the steam generation cost would be very high thus making operation non-viable in absence of project activity.

However, this alternative analysis is presented for comparison with other plausible baseline alternatives that were available. Therefore this alternative is considered as a part of the analysis.

Therefore the Alternative 1 is considered further for arriving at the baseline scenario.

Alternative 2- Coal based steam generation

In absence of CDM project activity, AML could have generated process steam using coal as fuel to its steam requirement. This alternative is in compliance with all applicable legal and regulatory requirements. This alternative has been assessed further in the baseline scenario analysis.

Therefore the Alternative 2 is considered further for arriving at the baseline scenario.

Alternative 3- Natural gas based steam generation

In absence of CDM project activity, AML could have generated process steam with Natural gas as fuel, to meet its steam requirement. This alternative is in compliance with all applicable legal and regulatory requirements. However this alternative would not be a credible and realistic alternative available with AML in absence of project activity due to non-availability of natural gas as fuel for steam generation to the plant. This alternative may not be a part of the baseline.

Therefore the Alternative 3 may be excluded from further consideration.

Alternative 4- Biomass residue based steam generation

In absence of CDM project activity, AML could have generated process with biomass residues as fuel, to meet its steam requirement. This alternative is in compliance with all applicable legal and regulatory requirements. Therefore the alternative is considered and assessed further in the baseline scenario analysis.

Therefore the Alternative 4 is considered further for arriving at the baseline scenario.

Evaluation of the alternatives are based on economic attractiveness and other critical considerations

The project proponent carried out a complete analysis among the credible and realistic alternatives (as mentioned above) based on the following key parameters:

- Steam generation cost
- Other important considerations

in order to determine the baseline and additionality.

Table B.5: Assessment of all the realistic and credible alternatives with AML in absence of the project activity

Parameters	Furnace Oil based steam generation	Coal based steam generation	Biomass Residue based steam generation
Capital Investment	**INR 12.00 million**	**INR 21.00 million**	**INR 20.00 million**
Levelized Steam Generation Cost[5]	INR0.731/kg steam	INR 0.351/kg steam	INR 0.428/kg steam
Cost Per annum	Steam Generation – 1.076 x 10^8 kg Cost of steam using FO = Rs.0.731/ kg of steam Cost incurred per annum = INR.78.65 million	Steam Generation – 1.076 x 10^8 kg Cost of steam using Coal = Rs.0.351/ kg of steam Cost incurred per annum = INR.37.78 million	Steam Generation – 1.076 x 10^8 kg Cost of steam using DOC = Rs.0.428/ kg of steam Cost incurred per annum = INR. 46.01 million
Other Considerations	1. FO is direct sourced product from refineries which is available at order minimizing risk of non-availability. 2. FO pricing is mature and is highly organized.	1. Coal is available in plenty 2. Organized and structured sector , therefore no concerns in availability and pricing mechanism	**Unorganized Sector and availability:** Renewable energy (biomass) in India is an un-organized sector with no proper mechanisms to make sure its sustained availability and price. Since the availability is governed by external factors like climatic conditions and rainfall there are uncertainties related to

[5] Document and evidences related at arriving Levelized steam generation cost have been provided to the validator.

			annual availability of biomass residues. Further the price mechanism is not structured and fluctuates between wide ranges. The pricing of biomass depends mainly on annual rainfall, farm produce and the demand scenario in that area. The price trend assessment reveals that there is an upward trend in the pricing. Under these circumstances AML has taken a challenge to invest in the project activity and use biomass residues to meet its process steam requirement.
Analysis on the basis of economic and regulatory parameters	1. Steam generation cost is very High	1. Steam generation cost is low	1. Steam generation cost is medium 2. There are risks associated to availability of biomass and fluctuation in the pricing of biomass residues.
Conclusion	This alternative option is the not the Baseline Scenario	This alternative option is the Baseline Scenario	Hence without the CDM revenue, this alternative was not a feasible option for AML to adopt. This alternative option is not the Baseline Scenario. *This alternative is additional since the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the*

			absence of the registered CDM project activity.

Baseline Emissions

Paragraph 6 of the Appendix B of the simplified modalities and procedures for small scale CDM project activities, states that *"For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used*"

Emission coefficient of fuel used in the baseline scenario

In absence of the project activity, the probable baseline scenario would have been a fossil fuel. Thus to determine emission co-efficient AML has used emission factor for fossil fuel (coal) and Net Calorific Value (NCV) as per 2006 IPCC Guidelines for National Greenhouse Gas Inventories for GHG emissions which is 96.1 tCO_2 /TJ and 4498 kcal/kg respectively.[6].

Emission coefficient of fuel used in the project activity

The fuel used is the biomass residues, which is carbon neutral fuel and therefore the emission coefficient (tC/TJ) is zero.

The baseline emissions are estimated on the net enthalpy developed by the baseline fuel, that would indicate amount of fossil fuel (coal) that would have been required to produce 13 TPH @ 11.5 kg/cm^2 steam generation. Thus the baseline computed is conservative which is explained in detail in section B.2. Thermal generation efficiency of the FBC boiler considered during the baseline calculation is 80 %[7].

Representation of key information and data sources to establish the baseline scenario:

No	Key information and data used for baseline	Source of information/ data
Boiler		
1.	Steam generation from boiler	Boiler operation log book for year 2006-07
2.	Steam Pressure	Boiler operation log book for year 2006-07
3.	Coal consumption in boiler	Calculated on the basis of boiler operating conditions of 13 TPH @ 11.5 kg/cm^2

[6] Emission factor and NCV has been considered as per IPCC 2006 guidelines. These values are fixed in baseline emission estimation during validation and through out the fixed crediting period.

[7] Evidence for Boiler thermal efficiency of 80 % is based on the detailed quotation received from M/s Cethar Vessels. Supportive is provided to the validator.

4.	Quantity of biomass consumed	Boiler operation log book for year 2006-07
5.	Net Calorific Value of biomass residue (DOC)	NCV test report of coal from Government approved laboratory as per IS:1350
Other data		
1.	Net Calorific Value (NCV) of fuel used in the baseline scenario	Based on 2006 IPCC 2006 IPCC Guidelines for National Greenhouse Gas Inventories Chapter-Introdcution - Net Calorific Value for Sub-bituminous grade coal; Chapter-Introduction, Table: 1.2, Page;1.18
2.	Emission Factor of fuel used in the baseline scenario	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
3.	Oxidation factor for fuel used in the baseline scenario	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
4.	Coal fired Boiler Efficiency	Based on Guarantee provided from detailed and firm offer received from M/s Cethar Vessel (boiler manufacturer)

Estimation of emission reductions resulting from the project activity

As per the small scale methodology AMS I.C, the emission reductions resulting from the project activity is calculated as a difference between the baseline emissions and the project emissions. The methodology does not require the project proponent to consider any emission due to leakage.

Baseline Emissions

The baseline emissions are calculated based on the most appropriate Baseline Alternative 2: Coal based steam generation. Therefore in absence of project activity the process steam requirement would be catered by coal combustion. Total coal that would have been combusted in the baseline scenario would amount to **17,720** tonnes per annum. The CO_2 baseline emissions have been calculated based on amount of fossil fuel (coal) that would have been used in absence of the project activity. IPCC default values for emission co-efficient have been used to calculate Baseline emissions. All baseline calculations are as per AMS I.C/version 09, 23 December 2006. Please refer to Section B.5 for baseline estimation calculation.

Project Emissions

As per the methodology, project emissions are zero as the project utilizes biomass residues renewable in nature. However to be transparent in emission reduction calculations we have considered emissions from boiler initial start up. These project emission parameters are incorporated in the monitoring plan. Section B.7.1 will describe parameter that will be monitored for project emissions.

Leakage

As per indicative Simplified Baseline and Monitoring Methodologies for selected Small-Scale CDM Project activity categories, the project participant shall evaluate if there is a surplus of the biomass in the region of the project activity, which is not utilized. If it is demonstrated that the quantity of available biomass in the region, is at least 25% larger than the quantity of biomass that is utilized including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

AML has made contract with the Biomass residue supplier for annual supply. Also a field survey for Castor biomass availability has been conducted by Department of Agriculture, Government of Gujarat[8]. Total DOC produced by utilizing castor comes out to be 25 % surplus over above the DOC consumption

[8] http://www.agri.gujarat.gov.in/informations/statistic-index.htm

by all industries[9]. This provides explanation to Attachment C of Appendix B. leakages due to transport of biomass residue have been neglected as they are negligible when compared with the baseline scenario of coal transport. In case of coal transport leakages would have been much higher than that of biomass transport. Therefore the justification to neglect remains applicable.

B.5. 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:

>>

Demonstrate that the proposed project activity is additional as per options provided under attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

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

In order to determine the project additionality i.e. the project is not the most appropriate alternative that would have occurred in absence of the registered CDM project activity demonstrated on the basis of Attachment A to Appendix B, which states that project participant to provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

1. Investment Barrier
2. Technology Barrier
3. Barriers due to prevailing practice
4. Other Barriers

The project activity additionality in AML case is by the route of Investment Barrier Analysis. Levelized steam generation cost analysis for different alternatives available have been presented under point B.4

Investment Barrier

Levelized cost comparison analysis

To justify that project activity is additional Investment barrier states a financially more viable alternative to the project activity would have led to higher emissions. We have compared levelized steam generation cost with FO, coal and Biomass residue based steam generation. A levelized cost analysis includes variable cost component and fixed cost components.

[9] Supportive of surplus biomass residue availability based on total consumption of DOC in different industries.

Source	Unit Cost (Rs/kg of steam)
Alternative 1: FO based steam generation	0.731
Alternative 2: Coal based steam generation	0.351
Alternative 3: Biomass residue based steam generation	0.428

The levelized cost analysis of the above alternatives, indicate that the steam generation cost in Alternative 3 is higher than Alternative 2. Even in this scenario AML has opted for biomass residue based steam generation to meet its annual requirement at a higher cost. CDM project activity cash flow may reduce the deficit for steam generation. This demonstrates that project activity is additional.

Other Barriers

A) Biomass Availability:

Biomass residue availability are dependent on climatic conditions based on which the DOC availability relies. AML primarily depend on the contract made with the biomass supplier. AML also has to keep on locating an additional biomass supplier as, non availability or shortfall in the biomass supply will halt or create sever economic impact on its steam generation and in turn on the textile unit. Therefore biomass residue availability and sourcing always remains a major barrier in the sustainable operation

B) Uncertainties in Biomass price:

One of main concern which still is evident in Biomass based steam generation is biomass price. Biomass pricing is still unstructured in India and their no fixed model for price determination. Even though AML has made an contract with biomass supplier for continuous availability, biomass price steadily increase and decrease on the seasonal variation of the castor crop. A price trend analysis on biomass has been presented to the validator which depicts the wide fluctuations in the biomass prices. This is very critical point and always bears the project activity sustainability.

The project is additional as it tries to overcome the above barriers by taking up risk of implementing steam boiler project activity. Further alternative like coal based steam generation has lowest levelised cost when compared with the biomass residue. This further justifies the project activity as a CDM project

which may help to improve the project feasibility and financial sustainability if the biomass prices increase in future. Above barriers are strong enough to prove the project activity of AML is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The procedure followed for estimating the emissions reductions from this project activity during the crediting period are as per the following steps which corresponds with AMS I.C / version 09, 23 December 2006.

Steps	Description	Equation Used	Methodological Choices
1.	Procedure followed for calculation baseline emissions (BE,y)	The simplified baseline emissions in the absence of the project activity are determined as per paragraph (6) of the applicable small scale methodology I.C/version 08. The energy baseline emissions are determined as the emissions associated to fossil fuel (coal) combustion per unit of output (steam) in the unit $kgCO_2$/ ton of steam. The emission coefficients of the fossil fuel used *i.e.* coal has been taken from IPCC 1996 guidelines. The baseline emissions (BE) in tCO_2 per year, is provided by the equation (1) $BE = \sum Q_{coal} \text{ X } NCVcoal \text{ X } EF_{coal} \text{ X } OXID_{coal}$---------- *Equation (1)*	The baseline emissions will be calculated on the basis para 6. of AMS I.C which states the fuel consumption of the technology that would have been used in absence of the project activity times an emission factor of fossil fuel displaced. IPCC emission factor is used in calculation.
1.	Contd…	NCV_{coal} is the Net calorific value of coal. EF_{coal} is the carbon emission factor of coal (2006 IPCC Guidelines for stationary source). $OXID_{coal}$ is the oxidation factor of the coal (2006 IPCC Guidelines for stationary source default	-

[10] Determined as the difference of the steam enthalpy and the feed water enthalpy .

		values), Q_{coal} is the quantity of coal in kg per year that would otherwise have been consumed to generate steam for process requirement. This is estimated as per Equation (2) given below. $\sum_i Qcoal = \left(Q_s \otimes E_{net} / NCV_{coal} \otimes Eff \right)$ ---------- *Equation (2)* ➢ Q_s is the quantity of steam produced in the year ➢ E_{net} is the net enthalpy increase[10] ➢ $NCV_{coa,l}$ is the Net calorific value of coal ➢ Eff is the efficiency (%) of the boiler The baseline emissions (BE) have been estimated as ex-ante as per equation (1) and amount to **32,059 tCO_2** each year. However the baseline emissions would be determined ex-post based on quantity of steam produced using biomass as fuel for each year.	

2.	Procedure followed for estimating emissions from project activity (PE,y)	As the project activity uses renewable biomass residues, there will be no project emissions within the project boundary as the CO_2 emissions due to combustion of biomass would be sequestered by the plant species. However boiler startup requires fuels viz; Diesel and Charcoal. Estimation of these small emissions have been considered these under project emissions. Formula is given below: $P.E = \sum Q_{diesel}$ or $\sum Q_{charcoal}$ X $NCV_{diesel\ or\ charcoal}$ X $EF_{diesel\ or\ charcoal}$ X $OXID_{diesel\ or\ coal}$ Where $\sum Q_{diesel}$ & $\sum Q_{charcoal}$ = Quantity of diesel and charcoal used during each boiler start-up operation $NCV_{diesel\ or\ charcoal}$ = Net calorific value of diesel and charcoal $EF_{diesel\ or\ charcoal}$ = Emission factor of diesel and charcoal (as per IPCC 2006 guidelines) $OXID_{diesel\ or\ coal}$ = Oxidation factor of diesel and charcoal (as per IPCC 2006 guidelines) Therefore P.E = 4 tCO_2 e	-
3.	Procedure followed for estimating leakage (L,y)	The above criterion is not applicable as per AMS I.C leakage criteria. Transport leakage during transport of Biomass residues from Biomass supplier to AML is neglected as the emissions are negligible. Further if leakages because of biomass residue transport when compared with baseline ie; coal would be far more in quantum. For eg: Typical distance of coal transport from the place of coal availability ie: Nagpur to AML project location is 400 kms. There fore the justification is valid.	As per the small scale methodology type I, category C (version 08) the "leakage" is considered *"If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered".*
4.	Procedure	The equation used to calculate emission reductions is	-

	followed for calculating Emission Reductions (ER,y)	$ER_{,y} = BE_{,y} - PE_{,y} - L_{,y}$ Where: ER,y =Emission Reductions (tCO_2) BE,y =Baseline emissions (tCO_2) PE,y =Project emissions (tCO_2) L,y =Leakage emissions (tCO_2) Annual Emission reduction (ER,y) of the project activity: **32,055 tCO_2e**	

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	NCV_{coal}
Data unit:	kcal/kg
Description:	Net calorific Value of coal
Source of data used:	Plant
Value applied:	4498
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on 2006 IPCC 2006 IPCC Guidelines for National Greenhouse Gas Inventories Chapter-Introdcution - Net Calorific Value for Sub-bituminous grade coal; Chapter-Introduction, Table: 1.2, Page;1.18
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	$EF_{,coal}$
Data unit:	tC/TJ
Description:	Emission Factor of coal
Source of data used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Value applied:	26.2
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	OX,coal
Data unit:	-
Description:	Oxidation factor of Coal
Source of data used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Value applied:	1.00
Justification of the choice of data or description of measurement methods and procedures actually applied :	The oxidation factor for coal data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Any comment:	Data will be kept for crediting period + 2 years.

B.6.3 Ex-ante calculation of emission reductions:

>>

S.No	Description	Unit		Data Source
A	**Enthalpy Calculation**			
1	Boiler capacity	kg	13000	Boiler steam capacity
2	Boiler operation Hours	hrs	8280	As per Preventive and Statutory Bolier Operation & Maintanence requirement from boiler manufacturer
3	Boiler blowdown	%	3	Maximum considered as per Industry standard
B	**Boiler feed water quantity per annum**	kg	1.11E+08	Calculated
1	Feed water temperature	deg	70	From temperature gauge
2	Specific steam enthalpy at temperature	kcal/kg	70	Standard Steam Table
3	Feed water enthalpy	MMkcal	7.76E+09	Calculated
C	**Steam Generation per annum**	kg	1.08E+08	Calculated
2	Operating Steam pressure	bar	11.5	Fixed Boiler Operation parameters
3	Specific steam enthalpy at temperature	kcal/kg	664.5	Standard Steam Table
4	Steam Enthalpy	kcal	7.15E+10	Calculated
D	**Net Enthalpy output**	kcal	6.38E+10	Calculated
1	Thermal Efficiency of FBC boiler	%	0.8	Based on Offer from M/s Cethar Vessels boiler manufacturer
2	Net Enthalpy input	kcal	7.97E+10	Calculated
3	Net Calorific Value (NCV) of coal	kcal/kg	4498	Based on 2006 IPCC 2006 IPCC Guidelines for National Greenhouse Gas Inventories Chapter-Introdcution - Net Calorific Value for Sub-bituminous grade coal; Chapter-Introduction, Table: 1.2, Page;1.18
	Total Coal consumption per annum	**kg**	**17720636**	Calculated
E	**CER Estimation Calculations**			

1	Annual heat energy from COAL	TJ	333.719	Calculated using conversion factor from kcal to kJ to TJ
2	Emission factor of COAL per unit energy	tC/TJ	26.2	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
		tCO_2/TJ	96.1	Conversion factor C to CO2
4	Oxidation Factor		1.00	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
5	Emission Coefficient of coal		1.81	Calculated
	Estimated Baseline Emissions	**tCO_2**	**32,059**	Calculated

Project Emissions Estimation

S.No	Description	Unit		Data Source
	DIESEL			
1	Quantity of diesel required for boiler startup	Lts	12	Boiler log book
2	Density of diesel	kg/L	0.89	Standard diesel density
3	Quantity of diesel required for boiler	kgs	10.68	Calculated
4	No of boiler start ups in an year	nos	12	Boiler log book
5	Total quantity of diesel used	kgs	128	Calculated
6	NCV of diesel	kcal/kg	10294	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
7	Energy content of diesel utilized	TJ	0.006	Calculated

8	Emission factor of diesel	tC/TJ	20.2	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
		tCO_2/TJ	74	Conversion from C atom to CO_2 (26.2 x 44/12)
9	Oxidation factor		1	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
10	Emissions from diesel use	tCO_2	0.4	Calculated
	CHARCOAL			
1	Quantity of charcoal required for boiler startup	kgs	100	Boiler log book
2	No of boiler start ups in an year	nos	12	Boiler log book
3	Total quantity of charcoal used	kgs	1,200	Calculated
4	NCV of charcoal	kcal/kg	7046	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
5	Energy content of charcoal utilized	TJ	0.035	Calculated
6	Emission factor of charcoal	tC/TJ	30.5	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
		tCO_2/TJ	112	Conversion from C atom

				to CO_2 (26.2 x 44/12)
	Oxidation factor		1	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
7	Emissions from charcoal use	tCO_2	4.0	Calculated
	Estimated project emissions	**tCO_2**	**4**	**Calculated**

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project Activity Emissions (tCO_2e)	Estimation of baseline Emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2008-09	4	32,059	0	32,055
2009-10	4	32,059	0	32,055
2010-11	4	32,059	0	32,055
2011-12	4	32,059	0	32,055
2012-13	4	32,059	0	32,055
2013-14	4	32,059	0	32,055
2014-15	4	32,059	0	32,055
2015-16	4	32,059	0	32,055
2016-17	4	32,059	0	32,055
2017-18	4	32,059	0	32,055
Total	**40**	**3,20,590**	**0**	**3,20,550**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$Q_{biomass}$
Data unit:	MT
Description:	Annual Quantity of Biomass consumed in FBC
Source of data to be used:	Log book at FBC plant
Value of data applied for the purpose	19,307 MT for financial year 2006-07

of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Monitoring: Total biomass which enters AML premise is weighed on a central weigh bridge and then feed to boiler bunker, any excess quantity at a time stored in the biomass storage area. As per requirement from storage area biomass residue feed to bunker after weighing on weighing scale. Total biomass residue quantity used in boiler is logged. Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Boiler Operator Calibration Frequency: Calibration of central weigh bridge is carried out once in one year through Department of Weights and measurements, Kalol, Gujarat.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	NCV_{DOC}
Data unit:	kcal/kg
Description:	Net calorific Value of biomass residue (DOC)
Source of data to be used:	Government approved Laboratory certificate
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4202
Description of measurement methods and procedures to be applied:	Monitoring: NCV Test certificate from a Government Approved Laboratory analysis as per IS standard: 1350. Data type: Estimated Archiving procedure: Paper and Electronic Recording Frequency: Once in three months Responsibility: Boiler Operator Calibration Frequency: Not applicable.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$Q_{feedwater}$
Data unit:	Kg
Description:	Quantity of feed water consumed for Steam generation
Source of data to be used:	Plant Monitoring Log book
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1.11E+08

Description of measurement methods and procedures to be applied:	Monitoring: Not applicable Data type: Calculated Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Boiler Operator Calibration Frequency: Not Applicable
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	Q_{steam}
Data unit:	kg
Description:	Quantity of steam produced per annum
Source of data to be used:	Plant Monitoring Log book
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1.08E+08
Description of measurement methods and procedures to be applied:	Monitoring: Steam quantity is logged through loop controller which displayed on Panel. Steam flow transmitter transmits signal to the controller. Therefore monitoring flow transmitter calibration is required. The calibration frequency is set once in a year. The data is monitored and maintained in log book. Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Boiler Operator Calibration Frequency: Calibration of steam flow transmitter is carried out once in one year
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$E_{feedwater}$
Data unit:	kcal
Description:	Feed water enthalpy
Source of data to be used:	Plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	7.76 E+09
Description of measurement methods and procedures to be applied:	Monitoring: Monitoring log book Data type: Calculated Archiving procedure: Paper and Electronic Recording Frequency: Daily

	Responsibility: Boiler Operator Calibration Frequency: Not applicable
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	E_{steam}
Data unit:	kcal
Description:	Steam enthalpy
Source of data to be used:	Plant Monitoring Log book
Value of data applied for the purpose of calculating expected emission reductions in section B.5	7.15E+10
Description of measurement methods and procedures to be applied:	Monitoring: Monitoring log book Data type: Calculated Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Boiler Operator Calibration Frequency: Not applicable
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	P
Data unit:	kg/cm^2
Description:	Steam pressure (pressure gauge)
Source of data to be used:	Plant Monitoring Log book
Value of data applied for the purpose of calculating expected emission reductions in section B.5	11.5
Description of measurement methods and procedures to be applied:	Monitoring: Pressure data is logged through loop controller which is displayed on Panel. Pressure transmitter transmits signal to the controller. Therefore monitoring pressure transmitter calibration is required. The calibration frequency is set once in a year. The data is monitored and maintained in log book. Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Boiler Operator Calibration Frequency: Calibration carried out once in one year through internal AML, Santej laboratory and the equipment necessary for Pressure transmitter are master calibrated by Government approved third party agency.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same

	procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$T_{feedwater}$
Data unit:	˚C
Description:	Feed water temperature
Source of data to be used:	Plant Monitoring Log book
Value of data applied for the purpose of calculating expected emission reductions in section B.5	70
Description of measurement methods and procedures to be applied:	Monitoring: Temperature gauge installed on suction line of feed water pump and logged in monitoring log book Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Boiler Operator Calibration Frequency: Calibration carried out once in one year through internal AML, Santej laboratory and the equipment necessary for Temperature thermo couple are master calibrated by Government approved third party agency.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Project Emissions

Data / Parameter:	Q_{diesel}
Data unit:	L
Description:	Annual Quantity of Diesel consumed in FBC Boiler start-up
Source of data to be used:	Log book at FBC plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	144
Description of measurement methods and procedures to be applied:	Monitoring: No of Standard 5 L Poly Propylene carboy Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Once in two month Responsibility: Shift In charge Calibration Frequency: Not Applicable
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	NCV_{diesel}
Data unit:	Kcal/L

Description:	Net calorific Value of diesel
Source of data to be used:	As per IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10,294
Description of measurement methods and procedures to be applied:	Monitoring: As per IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion Data type: Estimated Archiving procedure: Paper and Electronic Recording Frequency: Once in an year Responsibility: Shift In charge Calibration Frequency: Not applicable.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	EF_{diesel}
Data unit:	tC/TJ
Description:	Emission Factor for diesel
Source of data to be used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Value of data applied for the purpose of calculating expected emission reductions in section B.5	20.2
Description of measurement methods and procedures to be applied:	Monitoring: As per IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion Data type: Estimated Archiving procedure: Paper and Electronic Recording Frequency: Once in an year Responsibility: Shift In charge Calibration Frequency: Not applicable.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$Q_{charcoal}$
Data unit:	kgs
Description:	Annual Quantity of Charcoal consumed in FBC Boiler start-up fuel
Source of data to be used:	Log book at FBC plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1,200
Description of measurement methods	Monitoring: 50 kg bags are used for charcoal storage and use

and procedures to be applied:	during start-up of FBC boiler. Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Once in two month Responsibility: Shift In charge Calibration Frequency: Not applicable as mechanical weighing machine is standardised and approved by Government. Weights used in charcoal measurement are standardised as per Indian standards by Department of Weights and Measurements
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

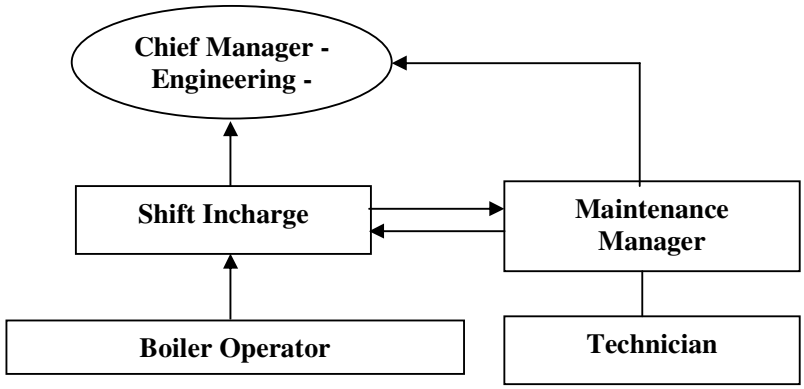
Data / Parameter:	$NCV_{charcoal}$
Data unit:	kcal/kg
Description:	Net calorific Value of charcoal
Source of data to be used:	As per IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Value of data applied for the purpose of calculating expected emission reductions in section B.5	7046
Description of measurement methods and procedures to be applied:	Monitoring: As per IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion Data type: Estimated Archiving procedure: Paper and Electronic Recording Frequency: Once in an year Responsibility: Shift In charge Calibration Frequency: Not applicable.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	$EF_{charcoal}$
Data unit:	tC/TJ
Description:	Emission Factor for charcoal
Source of data to be used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Value of data applied for the purpose of calculating expected emission reductions in section B.5	30.5
Description of measurement methods and procedures to be applied:	Monitoring: As per IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion Data type: Estimated

	Archiving procedure: Paper and Electronic Recording Frequency: Once in an year Responsibility: Shift In charge Calibration Frequency: Not applicable.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

B.7.2 Description of the monitoring plan:

>>



Roles and Responsibilities:

Chief Manager - Engineering:

1. Ensuring implementation of monitoring procedures lay down.
2. Internal audits and project conformance reviews.
3. Organizing and conducting training program on CDM and related activities for staff.
4. Implementing all monitoring control procedures
5. Associating with manager (QA) towards O&M of boiler and related measurement instruments
6. Reviewing records and monitored data.
7. Overall responsibility for correcting NOC and implementing corrective actions before verification.

Maintenance Manager:

1. Maintenance manager will look primarily in operation and maintenance cycle of the boiler installation.

Shift In charge:

1. Checks data logged by the boiler operator.
2. Interacts with Maintenance manager for smooth operation of Boiler.
3. Maintain calculations, record handling and monitored data verification as mentioned in section B.7.1

Boiler operator:

Boiler operator will collect data and report to the Shift incharge for further processing.

Technician:

Technician will help the maintenance manager in day to day maintenance of boiler.

During commissioning of FBC boiler a subject wise training[11] was provided by M/s Cethar vessels. AML therefore is aware and applies Good Management Practice (GMP) guidelines[12] of monitoring related to the boiler operation and maintenance. Preventive and statutory operation and maintenance schedule and procedures are accessible. Data monitoring procedures and person responsible for monitoring has been allocated. Paper and electronic form of data monitoring will be maintained to remove human errors.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>

Date of completing the final draft of this baseline section:
22/11/2006

Name of person/entity determining the baseline:
Mr. Shirishchandra Saraiya (Chief Manager – Engineering)

The Arvind Mills Ltd (AML).
P.O Khatraj, Tal. Kalol, District: Gandhinagar,
Pin-382 721, Gujarat, India
Tel: 91-2764-281100
Fax: 91-2764-281098
email: shirishchandra.saraiya@arvindmills.com

[11] Training certificate from M/s Cethar Vessels (OEM) on boiler training is separately attached.

[12] AML has set GMP procedures are data monitoring of Boiler

SECTION C. Duration of the project activity / crediting period

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

>>
10 years and 0 months

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

>>
13/09/2001 as per Letter of indent to Boiler manufacturer.

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

>>
30 years

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

>>

C.2.1. Renewable crediting period:

>>
Not applicable

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

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>
Not applicable

C.2.2. Fixed crediting period:

>>
10 years and 0 months

C.2.2.1. Starting date:

>>
30/07/2007 or date of registration of the project activity which ever will be later

C.2.2.2. Length:

>>
10 years and 0 months

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

The project activity consists of using renewable biomass residues and avoids usage of fossil fuel to produce process steam which is utilized for textile product manufacturing at AML, Santej facility. As the project activity is implemented in rural setting, extra care is taken to avoid any impact to the environment.

As the project activity generates process steam by utilizing DOC currently under controlled combustion, the activity thereby eliminates fugitive emissions that would have resulted due to the usual methods of biomass residue disposal i.e., open air burning or dumping. The project activity is installed with two cyclones in addition to mechanical dust collector which efficiently remove particulate matter emissions from biomass combustion. These emissions are significantly lower when compared with conventional fossil fuel (coal) fired boiler. AML being an environmentally conscious organization, the premise of the project activity is covered with considerable amount of tree plantation which creates a buffer and restricts any noise pollution.

AML, Santej has obtained all necessary clearances from Gujarat Sate Pollution Control Board during the implementation of the project activity:

- Site clearance certificate from GPCB.
- Consent and Authorization to Operate from Gujarat State Pollution Control Board (GPCB).
- Office of the Chief Inspector of Steam Boilers and Smoke Nuisance.

Article 12 of the Kyoto Protocol requires that a CDM project activity contributes sustainable development of the host country. Assessing the project activity, **positive** impacts on the local *environment* and on *society* are evident. A summary of measures taken by the project proponent to nullify any possible impact are illustrated below:

The project activity attributes are:

1. Reduces CO_2 emissions that would have been released by coal combustion.
2. Reduces the use of finite fossil fuels and contributes to sustainable development
3. Reduces pollution loads related to Coal

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

The project activity is biomass residue based steam generation and as per UNFCCC definition renewable biomass fuels are carbon neutral by nature. Therefore combustion will generate no GHG emissions. Also there are no environmental impacts by the implementation of project activity. Moreover the project activity complies to every regulatory requirement as stated by the State Pollution and Environment department Therefore the project activity poses "NO" impacts on environment.

SECTION E. Stakeholders' comments

>>

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

>>

During the project activity implementation, AML proactively went ahead and identified its probable stakeholders. AML had identified different stakeholder which are directly or indirectly related to the project activity which are:

1. Employees of AML
2. Local community
3. Contract Worker
4. Gujarat State Pollution Control Board (GPCB)

A intimation/notice was sent to all concerned stakeholders dated: 16/08/2002_to have stakeholder discussion for the project activity and receive feedback. Employees of AML were consulted first as they were immediate and most near to the project activity. Other stakeholders like local villagers were consulted individually and comments/feedbacks were taken between 19/08/2002 to 30/08/2002. A summary of all comments received during the stakeholder discussions were positive and encouraging.

E.2. Summary of the comments received:

>>

The positive comments received during the stakeholder engagement have been summarized below:

S.No	Stakeholder	Comments
AML EMPLOYEES		
1.	Mr. Sandeep Patel Manager Effluent Treatment Plant (Operation& Maintenance)	Mr.Sandeep Patel was involved in liaison with the Gujarat State Pollution Control Board during implementation and operation of project activity. Mr.Patel explained that biomass residues utilized in boiler will helps AML to reduce the Global Warming / Green gas effect directly on local and global level. The project will avoid use of fossil fuel (coal) which otherwise could have cause the overall increase of emissions. Overall the project activity will help AML to showcase its green image to its different stakeholders.
	Mr. Kalpesh Patel Shift-In- Charge, FBC	A personnel's who operate and maintain the project activity were also engaged in stakeholder dialogue. Positive comments received

	boiler & Mr. Suresh Mistry Shift- In- Charge , CPP	from them indicate an opportunity to learn about Fluidized Bed Combustion (FBC) technology and open new scope for us. The project activity uses DOC which is renewable biomass residue fuel and on a macro scale the initiative taken by AML will help reduce GHG emission that otherwise would have emitted if the same boiler had used fossil fuel to generate process steam.
CONTRACTORS		
2.	Mr. Mukesh Devda Contract supervisor, Durga Engineering	AML has taken good care of our safety by providing safety equipments like goggles, mask, ear plug etc. during the implementation and even today during maintenance schedule. Because of the project activity I have an employment and steady source of income and livelihood. The project has provided us economic sustainability.
	Mr. Dilaver Malik Contract Labor Utsav Contract	The project has provided livelihood. Living standard of me as well as labor has steadily gone up. The project creates no health problems, it more safe to work as AML provides all required safety measures like goggles, mask, ear plug etc.
	Mr. K.C. Ashoken Labor supplier , Durga Engineering	There are no complaints or concerns from any labor who are employed by me during the implementation of the project activity.
LOCAL VILLAGE REPRESENTATIVE		
3.	Mr. Madhaji Ranaji Thakor Sarpanch, Khatraj	Due to the project activity there are no problems / no negative effects to environment. The project activity has created new employment opportunity from the village Khatraj. Because of the project we have started castor oil seed farming which provides biomass residue DOC. This in turn can be utilized as a fuel in the boiler for steam generation. The farming activity provides us sufficient rate of castor oil plantation and additional source of income.

GUJARAT STATE POLLUTION CONTROL BOARD		
4.	GPCB[13]	GPCB has given the consent to operate for the project activity and has appreciated AML for its initiative for GHG emission mitigation project and sustainable development.

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

>>

The relevant comments and important clauses mentioned in the project documents / clearances like Detailed Project Report (DPR), environmental clearance, local clearances *etc.* were considered while preparing the CDM Project Design Document. The AML representative met with the stakeholders and apprised them about the project and sought their support for the project. Relevant documents are available for verification.

Positive feed backs and comments have been received from different stakeholders listed above for AML project. However as per UNFCCC requirements, the project design document (PDD) will be kept on the website for global stakeholder comments.

[13] AML has received an appreciation letter from GPCB for promoting clean technology project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Arvind Mills Ltd
Street/P.O.Box:	P.O Khatraj, Tal. Kalol, District: Gandhinagar,
Building:	--
City:	Ahmedabad
State/Region:	Gujarat
Postfix/ZIP:	382 721
Country:	India
Telephone:	91-2764-281100
FAX:	91-2764-281098
E-Mail:	Shirishchandra.saraiya@arvindmills.com
URL:	www.arvindmills.com
Represented by:	
Title:	Chief Manager
Salutation:	Mr.
Last Name:	Saraiya
Middle Name:	--
First Name:	Shirishchandra
Department:	Engineering
Mobile:	--
Direct FAX:	--
Direct tel:	--
Personal E-Mail:	--

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding received for the project activity.

Annex 3

BASELINE INFORMATION

Please refer to section B.4 for baseline and its development for the project activity.

Annex 4

MONITORING INFORMATION

Please refer to section B.7, B.7.1 and B.7.2 explains the monitoring methodology and description of monitoring plan.