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:

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

Version 01

Date: 22/11/2006

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

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Arvind Mills Ltd (AML), a subsidiary unit of "The Lalbhai group", has been implementing environmentally friendly technologies in their textile manufacturing facilities. The project activity is one such climate change initiative undertaken at AML, Santej.

The purpose of the project activity essentially is to utilize available biomass in the region effectively for process steam generation.

The project activity entails installation of a new biomass based Fluidised Bed Combustion (FBC) boiler to meet the process steam demand of the AML manufacturing facility. The biomass residues utilized for the project activity include viz; ground nutshell and de-oiled castor cakes. To ensure sustainable availability of biomass residues, AML has identified specific local suppliers to meet yearly requirements. The objective of the project activity would therefore be to contribute to the sustainable economic growth of the rural project region and conserve the environment through use of renewable biomass fuel and Green House Gas (GHG) emission reduction. The project will also help to bridge the ever-increasing demand on fossil fuel in the India.

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

Sustainable Development Indicators

Social well being:

The project activity replaces usage of fossil fuel by renewable biomass residues, which are sourced from edible oil industries in the state. AML will procure De-castor oil cakes and ground nut shells from edible

oil industries which are located nearby Santej village. Thus, the project activity helps in generating additional revenues to the local villagers and suppliers located in the rural areas. The project activity is therefore socially beneficial and helps in sustenance.

***Economical well being**:*

The project activity has opened up new business opportunities for the local agro based industries and biomass suppliers.

***Environmental well being**:*

The environmental benefits from the project activity include direct GHG emission reduction by avoiding usage of fossil fuel by use of renewable biomass residues. Further by avoiding fossil fuels, SO_2 emissions will not be emitted and thus the project activity is environmentally friendly.

***Technological well being**:*

The technology used in this project activity entails FBC type boiler. Some of the important points mentioned below attempts to look into the advantages of FBC technology in steam generation:

- Energy efficient than other boiler technologies
- Reduction in ash formation
- Environmentally friendly technology

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

A.3. Project participants:

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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:

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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 :

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The small scale project activity is located near Ahmedabad city, which is a capital city of Gujarat state.

Typical geographical pointers which provide unique details are provided as under:

GEOGRAPHICAL LOCATION

Latitude	23.1 degree N
Longitude	72.6 degree E
Height above MSL	55 m
Nearest Highway	12 Km from (National Highway-8)
Nearest Railway station	1 Km from (Kalol) town
Nearest Airport	29 Kms from (Ahmedabad) city

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

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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

Category I.C. *"comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels. Examples include solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass for water heating, space heating, or drying, and other technologies that provide thermal energy that displaces fossil fuel. Biomass-based co-generating systems that produce heat and electricity for use on-site are included in this category."*
Since the project entails installation of a FBC boiler designed to utilize renewable biomass in order to provide thermal energy in the form of steam and displaces fossil fuel usage, the category I.C. has been found to be appropriate. Please refer to Section B.2 for further details.

The project technology was provided by M/s Cethar Vessels and is described in this section.

Different renewable biomass fuels like Castor De-oiled cakes and Ground nut shells are fired in the FBC boiler. Annual approximate biomass requirement is 20,000 to 25,000 MT. Fuels are fired in proportion and based on the net calorific value (NCV). The biomass fuel obtained is crushed to a size of 1 – 10 mm and made available to AML. The heat produced in furnace converts de-mineralized water in boiler drum to steam required in the process of textile manufacturing.

The FBC system primarily consists of the fuel feeding system, the air distributor, the bed & in-bed heat transfer surface 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 10 kg/cm^2. The atmospheric air, which acts as both the fluidization air and combustion air, is delivered at high pressure and flows through the bed after being preheated by the exhaust flue gases. FBC boiler temperatures range between 700-950˚C which ensures complete combustion of biomass residues. The technology proves environment friendly as Low combustion temperature eliminates NO_x formation and low particulate emissions.

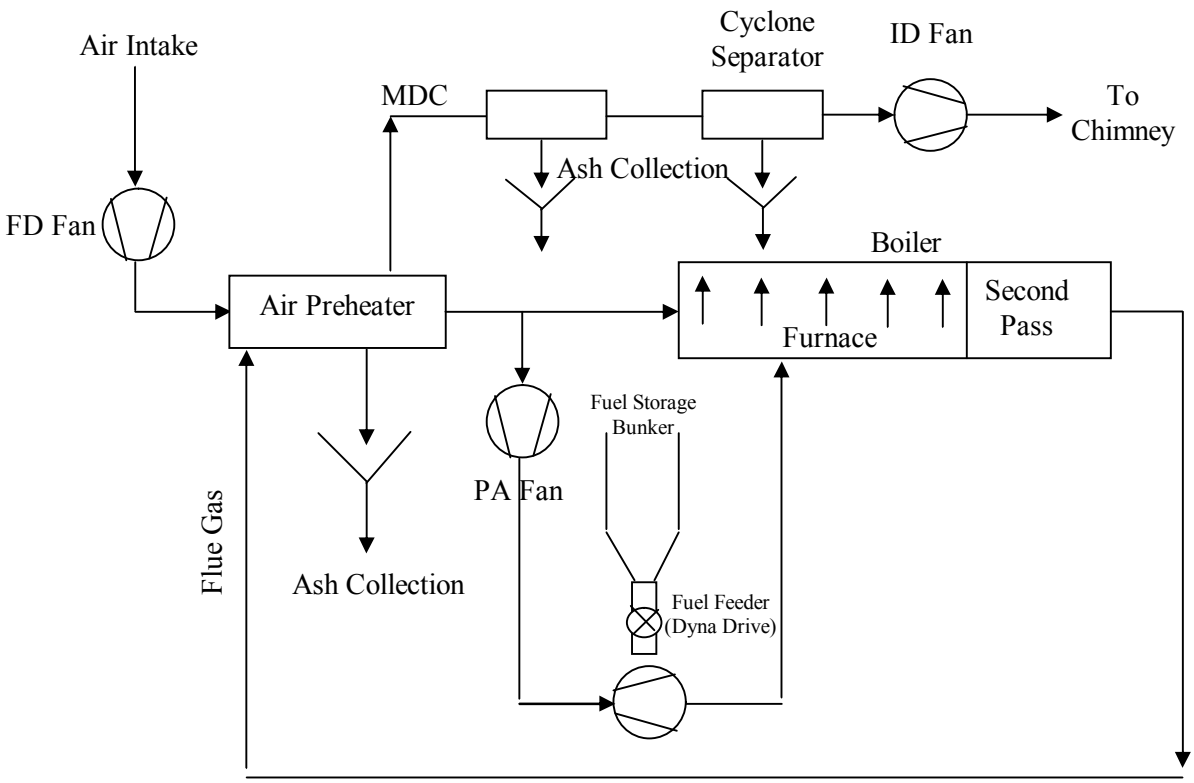

Fig A.4.2 (b): Process Flow Diagram at AML project

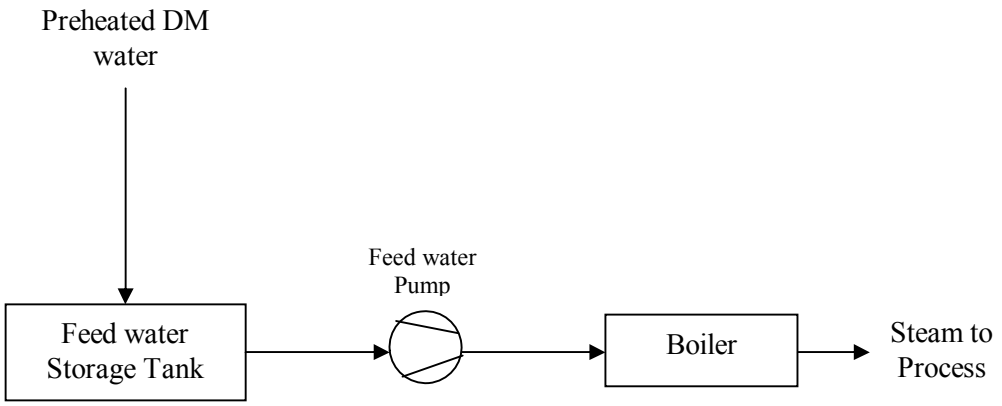

Fig A.4.2 (b): Process Steam Flow Diagram at AML project

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

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Years	Annual estimation of emission reductions in (tonnes of CO_2 e)
2007-08	31,354
2008-09	31,354
2009-10	31,354
2010-11	31,354
2011-12	31,354
2012-13	31,354
2013-14	31,354
2014-15	31,354
2015-16	31,354
2016-17	31,354
Total Estimated Reductions (tonnes of CO_2 e)	**3,13,540**
Total no of crediting period	10 years
Annual average over the crediting period of estimated reduction (tonnes of CO_2 e)	**31,354**

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

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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[1]

A proposed 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:

- With the same project participants;

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

- 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. 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:

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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:

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As stated above in Section A.4.2, Category I.C. *"comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels"* and is in line with the project activity, a renewable energy technology which provides AML with thermal energy in the form of steam and displaces fossil fuel usage.

Apart from the key applicability criteria stated above, the project activity is required to meet the following conditions in order to apply the baseline methodology:

Criteria 1: Where generation capacity is specified by the manufacturer, it shall be less than 15MW.

Justification 1: Since the project activity output includes thermal energy in form of steam alone, this criteria is not applicable

Criteria 2: 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 2: The energy output from the project activity less than $45MW_{thermal}$.

Criteria 3: Project activities adding renewable energy capacity should consider the following cases:

1) Adding new units;

2) Replacing old units for more efficient units.

Justification 3: The project activity entails replacing old unit for more efficient unit

As stated above, the project activity under consideration meets all the 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 and 7 of I.C. of Appendix B. The monitoring methodology would be based on the guidance provided in the paragraph 9 of I.C. of Appendix B.

B.3. Description of the project boundary:

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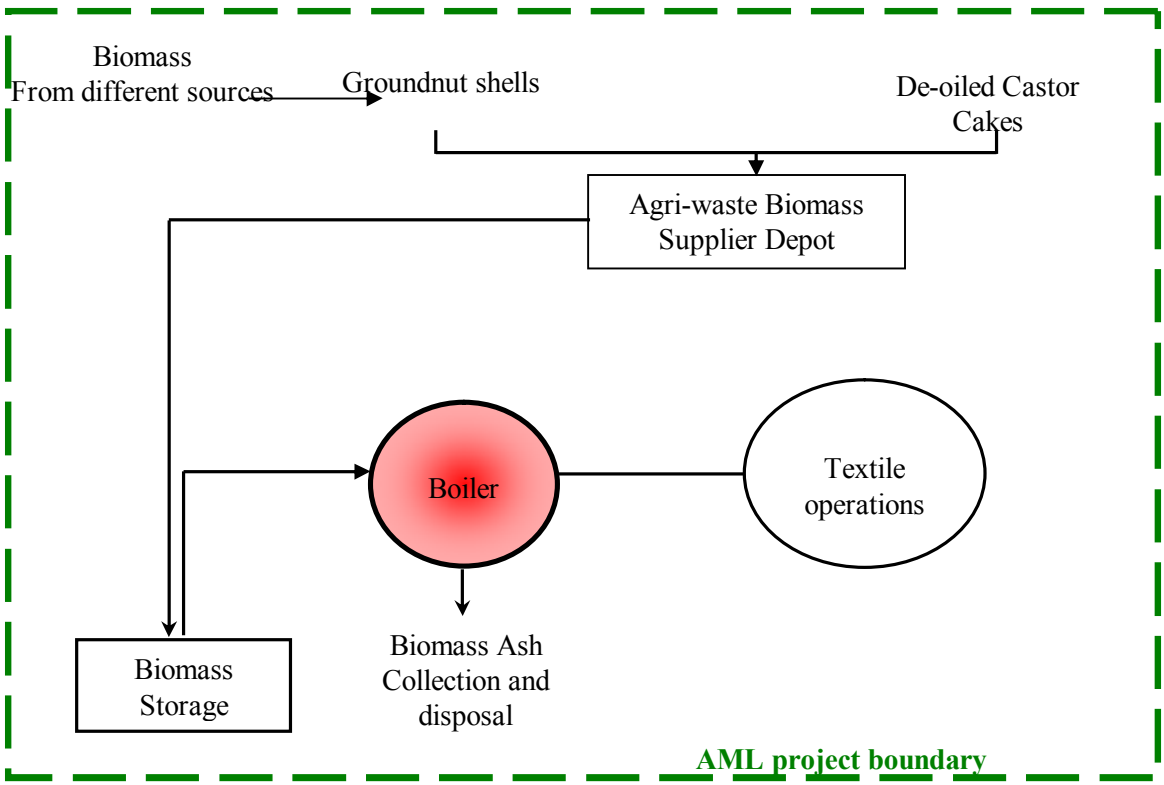
The project activity boundary covers entire area from the point of fuel supply from the different sources, supplier in the project activity boundary to the point of thermal energy (steam) generation which is strictly used for production processes. Thus, boundary covers fuel storage, internal transport of fuel, furnace, boiler and steam consuming equipments. 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.

The project boundary for the project activity is shown in figure B.1:



B.4. Description of baseline and its development:

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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

The fuel used by the generation unit before fuel avoided was coal whose emission coefficient as per the IPCC 1996 guidelines is 26.2 tC/ TJ and the net calorific value (NCV) of the same is 3600 kcal/kg.

Emission coefficient of fuel used in the project activity

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

In this project activity, the emissions in the baseline scenario and after the project activity are expressed as emissions per unit of steam (i.e. $kgCO_2$-e/ MT of steam). The emission baseline is the emissions in $KgCO_2$/ MT of steam in the baseline scenario (using coal as fuel). The baseline is computed is thus conservative which is explained in section B.2. To estimate the baseline, the quantity of coal that would have been used to generate steam in the absence of the project activity would be determined based on the conservative boiler efficiency of 80%.

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	Measured data of steam generation from boiler log
2	Steam Pressure	Boiler log book
3	Coal consumption in boiler	Boiler log book
Other data		
1	Net Calorific Value (NCV) of fuel used in the baseline scenario	IPCC Good Practice Guide

2	Emission Factor of fuel used in the baseline scenario	IPCC Good Practice Guide
3	Oxidation factor for fuel used in the baseline scenario	IPCC Good Practice Guide
4	Coal fired Boiler Efficiency	80%

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 conducted a field survey for biomass availability and has found quantity greater than 25 % in and around the district area. Therefore, the leakage related emissions would not occur. Further this aspects has been introduced in the Monitoring plan, and under situations wherein abundant biomass availability is not demonstrated, leakage effects for the year y shall be accounted for in the total ERs reported.

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

Name of person/entity determining the baseline:
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The Arvind Mills Ltd (AML).
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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:

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

(a) Project additionality i.e. the project is not the most appropriate alternative that would have occurred in absence of the registered CDM project activity and

(b) Baseline Scenario *i.e.* the most appropriate and conservative alternative that would have occurred in the absence of the registered CDM project activity for Baseline emission calculations

AML identified plausible project options, which include all possible courses of actions that could be adopted in order to generate steam to meet the process steam demand of AML manufacturing facility.

AML excluded options that

- do not comply with legal requirements and/or
- Encounter barriers related to availability of key resources such as fuels, materials, technology, or other circumstances that could not be overcome.

Further an assessment was conducted for each alternative to project activity with respect to the risks/barriers associated to implementation and their steam generation costs, in order to arrive at the baseline scenario i.e. the most likely future scenario in absence of the project activity.
The performance of the project activity and its associated emission reductions were evaluated with respect to the baseline scenario.

AML has identified the following plausible alternatives to meet the steam requirement of the AML manufacturing facility

Alternative 1- Furnace Oil based steam generation

In absence of CDM project activity, AML could have generated process steam with Furnace Oil as fuel, to meet its steam requirement. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline.

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 with coal as fuel to meet its steam requirement. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline.

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.

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 4 is considered further for arriving at the baseline scenario.

Table B-1: Assessment of all the realistic and credible alternatives with AML in absence of the project activity

Parameters	Alternative 1. Furnace Oil based steam generation	Alternative 2. Coal based steam generation	Alternative 3. Biomass Residue based steam generation
Steam Generation Cost	Rs.0.910/kg steam	Rs.0.297/kg steam	Rs.0.403/kg steam
Other Considerations	Non	Non	**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 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 the 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*.

Estimation of emission reductions resulting from the project activity

As per the methodology, 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. The baseline emissions and the project emissions are quantified as per the guidelines given in the methodology:

Process Steam Requirement

The boiler capacity is 13 TPH and it is expected to generate process steam to meet its process steam requirement.

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 **15,909** 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 08. Please refer to Section B.5 for baseline estimation calculation.

Project Emissions

With the implementation of project activity same amount of process steam would be produced using biomass residues. As per the methodology, project emissions are zero as the project utilizes biomass residues renewable in nature. Therefore there is no project emission resulting from the project activity. Please refer to Section D.2.1 for details.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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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) $BE = \sum Q_{FF} \text{ X } NCV_{FF} \text{ X } EF_{FF} \text{ X } OXID_{FF}$---------- *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_{FF} is the net calorific value (energy content) of fossil fuel as per IPCC guidelines EF_{FF} is the carbon emission factor of coal (IPCC Good Practice guide). $OXID_{FF}$ is the oxidation factor of the fossil fuel (coal) (see page 1.29 in the 1996 Revised IPCC Guidelines for default values), Q_{FF} is the quantity of fossil fuels (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. $\sum_i Q_{FF} = \left(Q_s \otimes E_{net} \Big/ NCV_{FF} \otimes Eff \right)$ ---------- *Equation (2)* ➢ Q_s is the quantity of steam produced in the year y ➢ E_{net} is the net enthalpy increase[2] ➢ NCV_{FF} is the net calorific value (energy content) of fossil fuel as per IPCC guidelines ➢ Eff is the efficiency (%) of the boiler The baseline emissions (BE) have been estimated as ex-ante as per equation (1) and amount to **31,354 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] Determined as the difference of the steam enthalpy and the feedwater enthapy .

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. PE=0;	-
3.	Procedure followed for estimating leakage (L,y)	The above criterion is not applicable in AML activity. Therefore no Leakage calculation is required in the project activity. Leakage as per stated criteria is zero tCO_2 e	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 followed for calculating Emission Reductions (ER,y)	The equation used to calculate emission reductions is $ER_{,y} = BE_{,y} - PE_{,y} - L_{,y}$ The project emissions are zero for the project. Therefore the emission reduction is calculated as per the give formula: ER,y = BE,y – PE,y - Ly 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) Emission reduction (ER,y) of the project activity: **31,354 tCO_2e**	-

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

Data / Parameter:	$NCV_{fossil\ fuel}$
Data unit:	Kcal/kg
Description:	Net calorific Value of fossil fuel (coal)
Source of data used:	Plant
Value applied:	5,000
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	$EF_{,fossil\ fuel}$
Data unit:	tC/TJ
Description:	IPCC Emission Factor of fossil fuel (coal)
Source of data used:	IPCC
Value applied:	26.2
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value applied is taken from Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook.
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	OX,coal
Data unit:	-
Description:	IPCC Oxidation factor of Coal
Source of data used:	Revised 1996 IPCC for National Greenhouse Gas Inventories: Workbook.
Value applied:	0.98
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value applied is taken from Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook.
Any comment:	Data will be kept for crediting period + 2 years.

B.6.3 Ex-ante calculation of emission reductions:

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	Baseline Emissions Estimation		
S.No	**Description**	**Unit**	**Coal**
	Enthalpy Calculation		
A	**Boiler feed water quantity per annum**	kg	110869200
	Feed water temperature	deg	70
	Sp.Enthalpy at feed water temperature	kcal/kg	69.99856692
	Feed water enthalpy	kcal	7760685116
B	**Steam Generation per annum**	kg	107640000
	Steam temperature	deg	179.8
	Steam pressure	bar	10
	Sp.steam enthalpy at temperature	kcal/kg	663.2989395
	Steam Enthalpy	kcal	71397497850
C	**Net Enthalpy output**	kcal	63636812734
	Efficiency of boiler	%	0.8
	Net Enthalpy input	kcal	79546015918
	NCV of coal	kcal/kg	5000
D	**Coal consumption per annum**	**kg**	**15909203**
	CER Calculations		
	Annual heat energy from COAL	TJ	333.043
	Emission factor of COAL per unit energy	tC/TJ	26.2
	Emission Coefficient of coal	tCO_2/TJ	96.07
	Oxidation Factor		0.980
	Baseline Emissions	**tCO_2**	**31,354**

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

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Year	Estimated Project Activity Emissions (tonnes of CO_2e)	Estimated Baseline Emissions (tonnes of CO_2e)	Estimated leakage(tonnes of CO_2e)	Estimated Emission Reduction (tonnes of CO_2e)
2008-09	0	31,354	0	31,354
2009-10	0	31,354	0	31,354
2010-11	0	31,354	0	31,354
2011-12	0	31,354	0	31,354

2012-13	0	31,354	0	31,354
2013-14	0	31,354	0	31,354
2014-15	0	31,354	0	31,354
2015-16	0	31,354	0	31,354
2016-17	0	31,354	0	31,354
2017-18	0	31,354	0	31,354
Total	**0**	**3,13,540**	**0**	**3,13,540**

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 of calculating expected emission reductions in section B.5	21,840 MT
Description of measurement methods and procedures to be applied:	Monitoring: Weigh bridge at the plant Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Shift In charge Calibration Frequency: 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:	$BF_{y,surplus}$
Data unit:	MT
Description:	Quantity of Biomass in surplus
Source of data to be used:	Biomass survey report (Department of Agricuture and Co-operation GoG) and (Production data from NK Protiens)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	32,374 MT (44%)
Description of measurement methods and procedures to be applied:	Monitoring: NA Data type: Estimated Archiving procedure: Paper and Electronic Recording Frequency: Once in one 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:	$NCV_{biomass}$
Data unit:	Kcal/kg
Description:	Net calorific Value of biomass fuel
Source of data to be used:	Laboratory certificate (government approved)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4,200
Description of measurement methods and procedures to be applied:	Monitoring: Laboratory analysis. Data type: Estimated Archiving procedure: Paper and Electronic Recording Frequency: Once in three months 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:	$Q_{feedwater}$
Data unit:	MT
Description:	Quantity of feed water consumed
Source of data to be used:	Plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	11,08,69,200
Description of measurement methods and procedures to be applied:	Monitoring: Plant (FBC system) Data type: Estimated Archiving procedure: Paper and Electronic Recording Frequency: Daily 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_{steam}
Data unit:	MT
Description:	Quantity of steam produced per annum
Source of data to be used:	Plant (FBC system)
Value of data applied for the purpose	13

of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Monitoring: Plant Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Shift In charge Calibration Frequency: 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:	MMkcal
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	7,761
Description of measurement methods and procedures to be applied:	Monitoring: NA Data type: Calculated Archiving procedure: Paper and Electronic Recording Frequency: Daily 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:	E_{steam}
Data unit:	Gcal
Description:	Steam enthalpy
Source of data to be used:	Plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	71,397
Description of measurement methods and procedures to be applied:	Monitoring: NA Data type: Calculated Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Shift In charge Calibration Frequency: Not applicable
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same

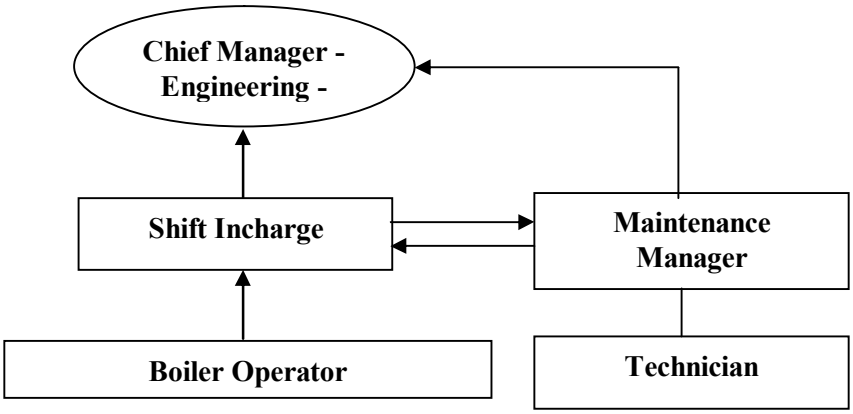
	procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	P
Data unit:	Kg/cm^2
Description:	Steam pressure (pressure gauge)
Source of data to be used:	Plant (Boiler)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10
Description of measurement methods and procedures to be applied:	Monitoring: Discharge side of Boiler drum Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Shift In charge Calibration Frequency: 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:	$T_{feedwater}$
Data unit:	˚C
Description:	Feed water temperature (temperature gauge)
Source of data to be used:	Plant
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: Inlet to feed water line Data type: Measured Archiving procedure: Paper and Electronic Recording Frequency: Daily Responsibility: Shift In charge Calibration Frequency: 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

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 engineer for smooth operation of Boiler.
3. Maintain calculations, record handling and monitored data verification as mentioned in section D.3.

CDM – Executive Board

Plant operator:

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

Technician:

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

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

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Arvind Mills Ltd. and their associated experts

Mr. Shirishchandra Sariaya
Chief Manager - Engineering
The Arvind Mills Ltd (AML).
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Fax: 91-2764-281098
email:shirishchandra.saraiya@arvindmills.com

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:

>>
01/08/2001

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:

>>
30/06/2007

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:

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The project activity consist of using renewable agriculture waste biomass fuel and avoids usage of fossil fuel to produce process steam in new boilers at AML premises.

AML has obtained necessary clearances from:

- 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.

The project activity:

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

Possible environmental impacts from combustion of biomass residues in boiler will result in suspended particulate matter (SPM) are controlled by air pollution control devices in order to meet air quality requirement in the rural area setting.

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:

>>

There are no significant impacts from the project activity.

SECTION E. Stakeholders' comments

>>

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

>>

The project activity implemented by AML has identified different stakeholder at various stages in the project:

1. Employees
2. Local community
3. Gujarat State Pollution Control Board (GPCB)

The local community have been a major contributor in the development of the project activity because the project activity provides occupation in either primary or secondary level.

E.2. Summary of the comments received:

>>

AML has been proactive in sustainability issues during implementation of project activity. Even before the project was conceptualized, AML had identified stakeholders and developed a dialogue between different stakeholders who had direct or indirect impacts due to the project activity. The stakeholder engagement was mainly carried out to understand the concerns of the different stakeholders important for the project activity development. The positive comments received from the engagement have been summarized below:

Employees:

The employees were aware of the project activity before the commissioning of the project activity. Comments were taken from employees working in CPP, SBU's, FBC boiler staff & labor. The opinion of employee working in AML suggests that project will be an environment friendly project producing steam using biomass residues efficiently. Employees are happy to have work experience with boiler having advance and indigenous technology. All employees have unanimously expressed project activity as positive impacting on environment in and around plant areas. Employees have appreciated the technology implemented by AML to be eco-friendly.

Local community:

Local community has been an important contributor in development of project activity and AML as a whole at Santej. As the industry is set-up in rural area setting, many local residents mainly Farmers and Farm labourers have been benefited because of its project activity. Businesses like Agriculture, Dairy and other services have flourished because of AML setting up plant in that region. 35 persons from villages are

on direct roll and many others are in contractor's roll. 7 numbers are employed in FBC boiler project activity. Local people understand the nature of project activity, advantages over conventional boiler units and benefits to environment. They have felt biomass will help in preserving environment. Overall the local community has provided support and encouragement to the project.

Gujarat State Pollution Control Board (GPCB)

GPCB's consent approval to operate the project activity proves that emissions that arise from this project activity are well below the prescribed limits under Environment Protection Law. Moreover GPCB has appreciated AML for its effort to proactively take CDM projects and implement it, thus reducing valuable fossil fuels which can be used for many more important activities.

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

>>

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.

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,
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Represented by:	
Title:	Group Vice President
Salutation:	Mr.
Last Name:	Yadav
Middle Name:	--
First Name:	Dinesh
Department:	Operations
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.