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

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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:

Biomass based Steam Generation at Machhar Polymer Pvt. Limited, Dist-Baroda, (Gujarat), India.

Version 1, dated 21May 2008

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

Machhar Thermocole Group consist of 3 no. of companies having separate entity, Machhar Polymer Pvt. Ltd. is one of them. Other company's names are as under:-

1- Machhar packaging services pvt. Ltd.
2- Utsav polymer Pvt. Ltd.

Machhar Polymer Pvt. Ltd. incorporates in 1996. Initially company's main aim was to cater Videocon group packing requirements. The company (Machhar Polymer Pvt. Ltd.) assured by the Videocon to take 80% of its packing requirements from Machhar Polymer Pvt. Ltd. Machhar Polymer have successfully cater Videocon group and marketed their excellence in tailor made solution for various sector like Pharmaceutical packaging, industrial insulations, components for air cooler and air conditioners, taken concept with association of BASF for use of EPS into building and roads construction. Today Machhar Polymer is well-known in the Gujarat region by quality product with customer satisfaction.

Our client list include

- Videocon Group of Industries
- Hitachi Home & Life Solutions
- JCT Electronics Ltd.
- Sun Pharmaceutical
- Cadila Health Care
- Neon Antibiotic
- Wockhardt Pharmacy

For polymer production process steam is an essential utility and for the steam generation project proponent is using boiler. Earlier to the project activity, the steam was generated from 2TPH coal fired boiler. The coal fired boiler was causing significant GHG emissions. Now project activity involves installation of new 4TPH/3TPH fire tube multi-fuel boiler (10.54 Kg/cm^2) to facilitate steam generation from biomass based renewable fuels (Bagass, Briquettes, Agrowaste etc.) with manual biomass firing. 4TPH capacity refers to coal as fuel while 3TPH refers to loose biomass. The reduction is due to low density of loose biomass.

Purpose of the project activity:

The 2TPH Coal fired boiler was contributing to GHG emissions. This CDM project activity primarily aims at reducing these GHG emissions by installation of new 4TPH/3TPH (FBC/Agroman) based

combination fire tube boiler. Fuel used in boiler is renewable biomass or agrowaste hence it is reducing GHG emission by replacing fossil fuel coal. This boiler fully comply the existing pollution norms and also operating efficiently (Ref: mandatory records for pollution norms), however Machhar Polymer has opted to have environmentally sustainable solution for steam generation and therefore it has taken-up this project activity.

Technology employed:

The project involves use of renewable fuel like biomass based agrowaste for steam generation in newly installed combination boiler with manual agro waste firing. The furnace is compartmentalised in two parts (4 TPH FBC chamber/ 3 TPH fixed grate chamber) to enable better, independent and efficient performance. The boiler consumes 2.44 KT of coal per year producing 13.98 KT of steam/year and generating 8216 tonnes of CO_2-e per year by emitting CO_2. This project has capacity to reduce overall GHG emissions by 8216 tonnes of CO_2 equivalent per year and 82160 tonnes of CO_2 equivalent over a 10-year time frame. Apart from GHG emissions reductions, the project significantly reduces SO_x emission and NO_x emissions.

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Contribution of the project activity to sustainable development:

The project has evident contribution to sustainable development, which are as follows:

1. Reducing coal requirement by use of sustainable source of energy
2. Reducing coal import requirement for the country
3. Better use of agricultural residues such as bagass from sugarcane or briquette from waste biomass will offers monetary benefits to the farmers, thus making villages more self-sustainable
4. Social and economic benefits by generating employment for the deprived segment of the society at the rural level (which is major concern in India) for collection, processing and supply of the biomass
5. Employment generation in urban area as due to manual firing of biomass based agrowaste more charge-men are required as compared to operators required for coal fired boilers.
6. Installation of more briquette manufacturing plants near villages thus bringing industrialization near villages and contributing to decentralized growth
7. Reducing the amount of GHG emissions and other pollutants

Thus the project is in accordance with interim approval criteria suggested for sustainable development by the DNA in India i.e. Ministry of Environment & Forest, Government of India for CDM projects.

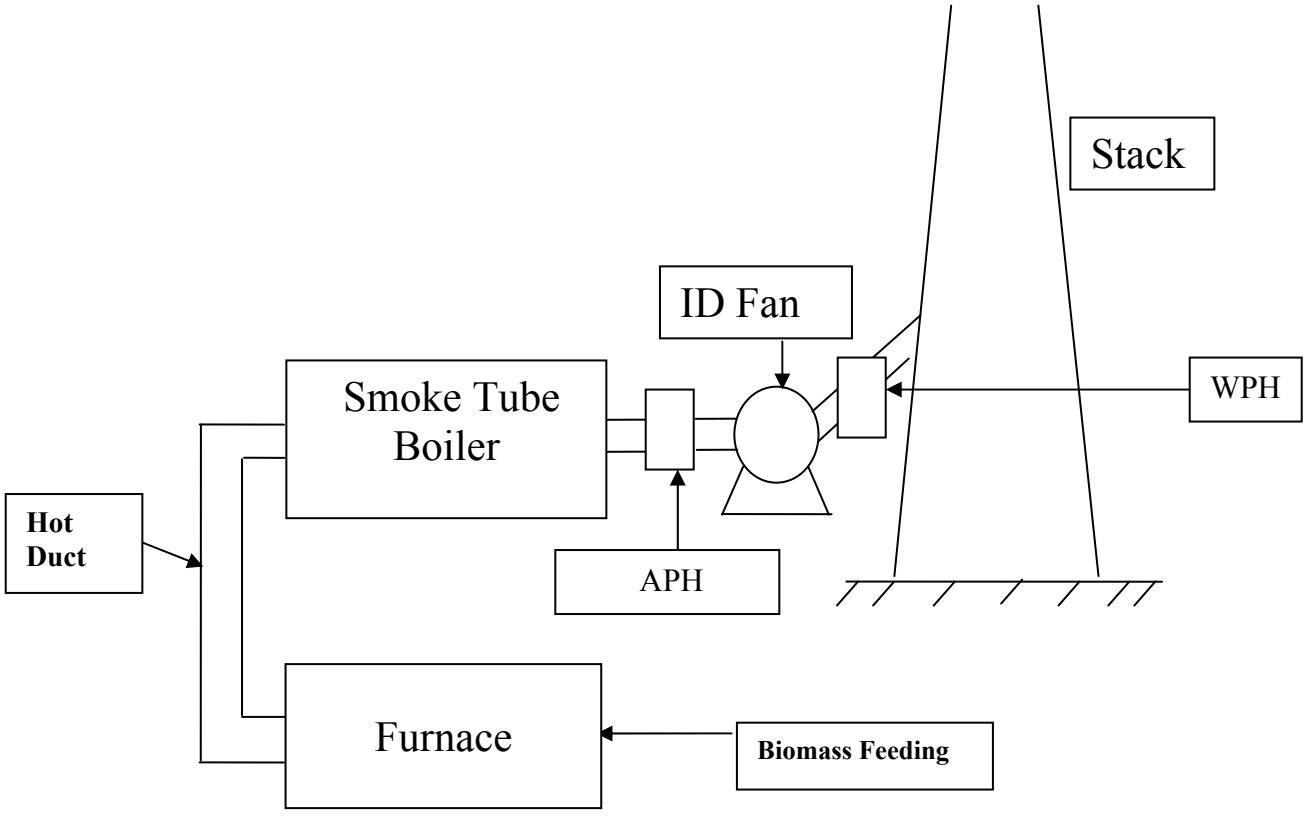
A.3. Project participants:

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)
Ministry of Environment & Forest, New Delhi, India	Machhar Ploymer Pvt. Limited, Karjan, Dist. Baroda (Gujarat), India	No

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

In the project activity, smoke tube boiler has facilitated with compartmentalised furnace for biomass firing. Proposed biomass fuel consists of bagass, briquette, rice husk etc. The technology involves an Industrial Horizontal Combination (AGROMAN/FBC) shell fired boiler with hot duct, a biomass fired furnace and an induced draft systems. The furnace is compartmentalised in two parts (4TPH FBC chamber/ 3TPH fixed grate chamber) to enable better, independent and efficient performance. Agrowaste burns over the grate and the hot flue gas resulting at a temperature of 600 to 700^{O}C is supplied to the tube side of the boiler through a connecting duct. Here the water is fed to the shell side of the boiler. Flue gases leaving from boiler at 240 °C goes in APH (Air Pre Heater) unit. Heat is recovered from flue gases to produce hot air up to 110 °C for combustion in furnace. After this, heat from the flue gases is recovered in the economiser. It is heat recovery unit placed between ID fan and Chimney. Water gets heated up to 42 °C in economiser and fed in the boiler shell. Emissions from the boiler with respect to SOx and NOx are lesser than that with Coal firing and also well within prevailing norms.

Figure showing the Arrangement of the project activity:



In the absence of the project activity, 2TPH smoke tube Coal fired boiler was used for steam

generation. In this project activity, (4TPH FBC chamber/ 3TPH fixed grate chamber)smoke tube boiler is used for steam generation.

Switching from coal to renewable biomass offers various advantages with respect to emissions and leakage of fuel during transportation which is as follows:

1. GHG emissions are reduced by 8216 tonnes of CO_2 equivalent per year. Thus the project has the capacity to reduce GHG emissions by 8216 tonnes of CO_2 equivalent per year. In addition to this, SOx & NOx emissions are also reduced significantly. Thus renewable biomass fuel is environment friendly.

2. During transportation of coal, losses of fuel are more. Hence due to large distance of coal supplier from the plant there is requirement of more fuel for transportation as compared to bagass .

Availability of Bagass for Steam Generation:
Machhar Polymer Pvt. Ltd, Karjan is getting bagass from the following companies in the region of 15 to 100 Km.

1. Baroda Sugars
2. Dharikheda Sugar
3. Ganesh Sugar
4. Pandavi Sugar

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

A.4.1.1. Host Party (ies):

Country: India

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

State: Gujarat

A.4.1.3. City/Town/Community etc:

Town: Karjan, Dist Baroda

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

The project activity is located at the boiler house of Machhar Polymer private Limited, 39, Juni Jithardi Village Road, Near Karjan Town, Dist. Baroda, Gujarat, India.
Plant is approximately 45 KM away from Baroda on Baroda - Bharuch road. Karjan town lies on latitude 22 3' 0.0174" and longitude 73 7' 17.6406". Area is neat & clean and is without pollution.

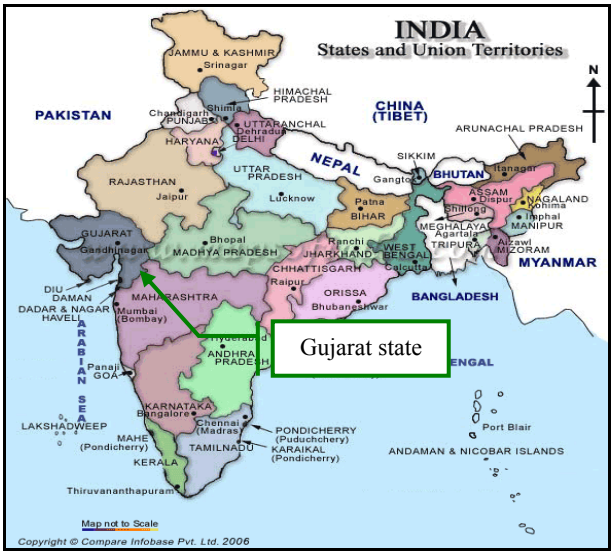


Figure 1: Map of India showing the location of Gujarat State in India

Figure 2: Map of Gujarat showing the location of Baroda district.

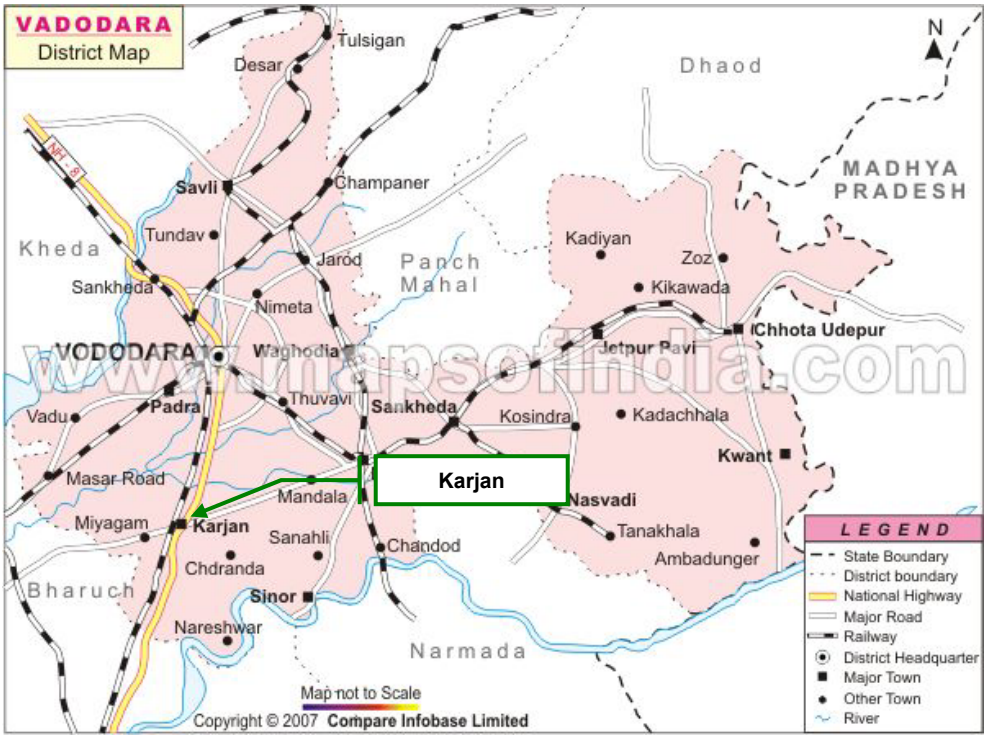


Figure 3: Map of Baroda District showing Location of Karjan

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

Category of small-scale CDM projects:

Referring to the UNFCCC CDM website, as per appendix B to the simplified modalities & procedures (M&P) for small-scale CDM project activities, type and category of this project activity are:

Type: Type I: Renewable Energy Projects
Category: I.C: Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)

Description of environmentally safe & sound technology applied:

Earlier with coal as boiler fuel, significant quantity of GHG emission in terms of CO_2, CH_4 & N_2O was taking place along with emission of SOx due to Sulphur in fuel. All these emissions though well within existing pollution control board norms are still non-sustainable and are not environment friendly.

The project activity involves installation of new combination boiler in which renewable biomass fuel is used in the boiler to solve the main problem of GHG emissions by carrying out significant

reduction in the emissions of these gases. Also SOx & NOx emissions are significantly reduced. The technology used promotes the use of the biomass-based fuel in the boiler for steam generation thereby contributing to solve the problem of energy crisis by reducing the use of coal. Thus the technology applied results in safe environmental condition by proper use of agricultural waste instead of GHG emitting fossil fuels.

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

The chosen crediting period is 10 years which is fixed crediting period. Estimated amount of emission reductions over these 10 years is as follows:

Years	Estimation of annual emission reductions in tonnes of CO_2 e
Year 2009	8216
Year 2010	8216
Year 2011	8216
Year 2012	8216
Year 2013	8216
Year 2014	8216
Year 2015	8216
Year 2016	8216
Year 2017	8216
Year 2018	8216
Total estimated reductions (Tones of CO_2 e)	**82160**
Total number of crediting years	**10 years**
Annual average of the estimated reduction over the crediting period (t CO_2 e)	**8216**

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

No public funding has been involved in this project. There is no national or international public funding whatsoever for this project. Machhar Polymer Pvt. Ltd will make all investments from its own sources. Also there is no subsidy element in implementation of the project activity.

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

Paragraph 2 of Appendix C of the Simplified Modalities and Procedures for Small Scale CDM project activities states that:

"2. A proposed small-scale project activity shall be deemed to be a debundled 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;
- In the same project category and technology/measure; and

- 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"

As none of the above condition is applicable to this CDM project activity, it is not a debundled component of a large-scale project activity.

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:

Paragraph 1 of "Type AMS. I. C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" of appendix B of the simplified M&P for small-scale CDM project activities, states that:

"1. This category 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 are included in this category."

At this project site, Steam is the major utility in the plant, which is generated by combustion of fossil fuel coal emitting GHG. Through this project, coal is displaced by renewable biomass which will reduce the anthropogenic GHG emissions.

Thus type and category of this project activity are:

Type: Type I: Renewable Energy Projects
Category: I.C. Thermal energy for the user with or without electricity (Version 13: Valid from 28March, 2008 onwards)

Monitoring methodology and plan as per Paragraph 18 of "Type AMS. I. C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" of Appendix B of the Simplified M&P for Small-Scale CDM Project Activities, states that:

"18. Monitoring shall consist of:

(a) Metering the energy produced by a sample of the systems where the simplified baseline is based on the energy produced multiplied by an emission coefficient.

OR

(b) Metering the thermal and electrical energy generated for co-generation projects.

OR

(c) If the emissions reduction per system is less than 5 tones of CO_2-e a year:

(i) Recording annually the number of systems operating (evidence of continuing operation, such as on-going rental/lease payments could be a substitute); and

(ii) Estimating the annual hours of operation of an average system, if necessary using survey

methods. Annual hours of operation can be estimated from total output (e.g. tones of grain dried) and output per hour if an accurate value of output per hour is available."

In this project activity for monitoring, guideline suggested in paragraph18 in subhead (a) of "Type-I, AMS. I. C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" of Appendix B of the Simplified M&P for Small-Scale CDM Project Activities is followed.

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

Justification of the choice of the project type & category:

Paragraph 1 of "Type-I AMS. I.C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" of appendix B to the simplified M&P for small-scale CDM project activities states that "This category 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 are included in this category."

In this project, renewable agricultural residues or agrowaste displace coal (fossil fuel). Thus, this project activity uses renewable energy to produce thermal energy thereby displacing fossil fuel. Therefore this project falls under category AMS. I.C.

In this project, (4TPH coal /3TPH biomass) fired boiler is put in service to carry out steam generation, which is derated to 3TPH with biomass firing. The boiler capacity of 4TPH is equivalent to 3.1MW, which is less than the limit of 45 MW of maximum output capacity as specified in Annex-II "Simplified Modalities & Procedures for Small Scale CDM Project Activities" for Type (i) project activities: renewable energy project activities with a maximum output capacity equivalent up to 15 megawatts (or an appropriate equivalent) (decision 17/CP.7, paragraph 6 (c) (i)). Thus, this project reduces anthropogenic emissions by sources and its maximum output capacity is less than 45 MW. Therefore it confirms to this category thereby qualifying as a small-scale project activity.

B.3. Description of the project boundary:

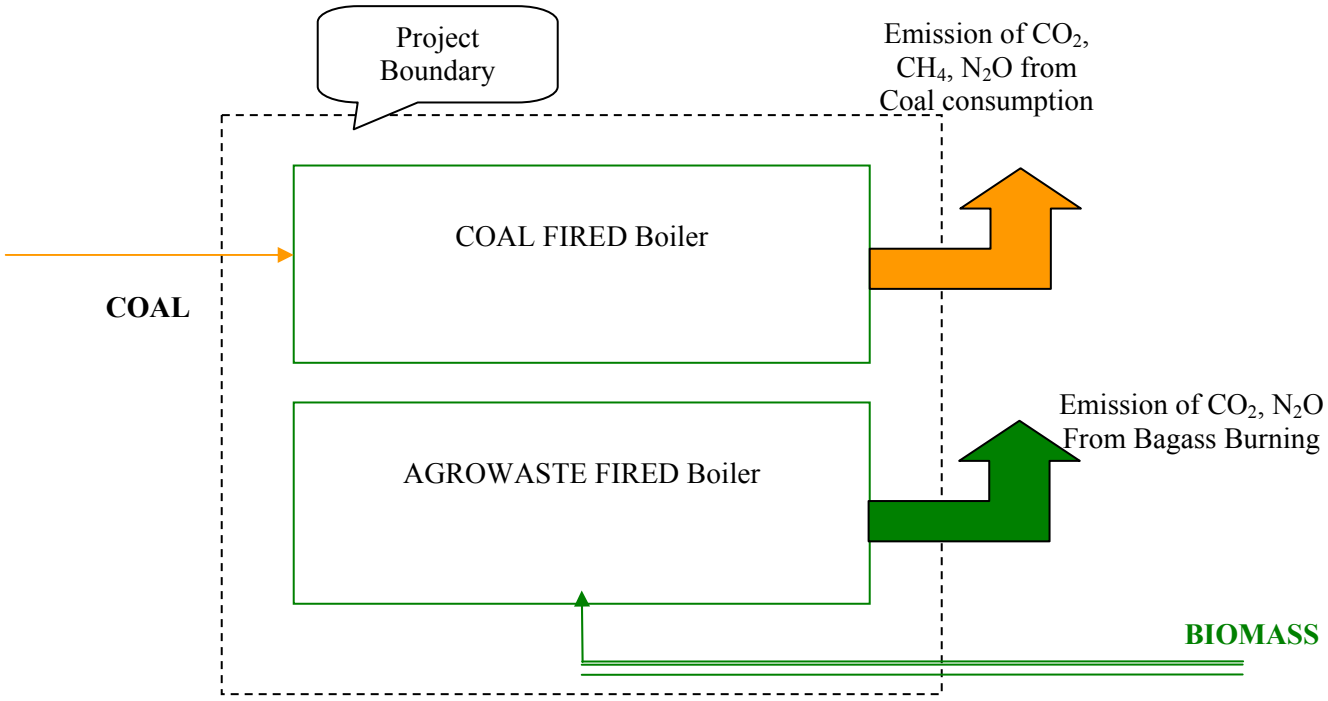
As per paragraph 5 of "Type I, AMS. I. C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" of Appendix B of the simplified M&P for small-scale CDM project activities, project boundary considerations are:

"5. The physical, geographical site of the renewable energy generation delineates the project boundary."

As the project activity involves GHG minimization in steam and heat generation, therefore project boundary includes steam and heat generation area.

GHG emissions, with and without the project activity, are shown below

Figure 5: Project boundary for Project Activity at Machhar Polymer Limited, Karjan, Baroda (G.S.), India



The project boundary consists of the steam generation system where renewable biomass (agricultural residues) or agrowaste is used for steam generation. Steam generation system consists of the boiler, furnace, hot duct, economizer, and chimney.

B.4. Description of baseline and its development:

Baseline as per Paragraph 6 of "Type AMS. I. C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" of Appendix B of the simplified M&P for small-scale CDM project activities states that:

"6. 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."

Therefore the proposed baseline is the GHG emissions that would have occurred due to use of coal in the boiler in absence of this project activity.

Key information and data used to determine the baseline scenario (variables, parameters, data sources etc.) are:

Sr.	Key information /Data / Parameters	Average Value	Data Source
1.	Coal Consumption in Boiler(On design)	KT/year 5.04	Equivalent Coal consumption based on the actual biomass consumption as per boiler log-sheets maintained at Machhar Polymer Pvt Ltd
2.	Net Calorific Value (NCV) of coal(Lignite)	28 TJ/KT	Table 2.3 of Chapter 2 of Volume 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
3.	Steam Generation(On design)	KT/year 25.2	Will be taken from boiler log-sheets maintained at Machhar Polymer Pvt. Ltd.
4.	CO_2 Emission Coefficient for Coal	96100 Kg/TJ	Table 2.3 of Chapter 2 of Volume 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
5.	Carbon oxidation factor for coal	1	Table 1.4 of chapter 1 of volume 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories

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:

The proposed project activity is additional (using Attachment A to Appendix B of the simplified M&P for small-scale CDM project activities) because the project activity would not have occurred anyway due to the following barriers:

(a) Investment Barrier: A financially more viable alternative to the project activity would have led to higher emissions.

In this case coal is the more financially viable alternative. As following table shows Kcal per rupee is highest in case of imported coal, it is easier to continue with older practice.

Sr. No.	Fuel	Calorific Value (Kcal/Kg)	Price of Fuel (Rs/kg)	Heat Value of Fuel per rupee (Kcal/Rs)
1	Imported Coal	5800	2.4	2417
2	Industrial Coal	4500	2	2250
3	Petcoke	8200	4.1	2000
4	Lignite	3500	1.86	1882
5	Bagass	2250	1.15	1957

Here we are using agrowaste like bagass in project activity which is giving lower calorific heat per rupee. So as compared to coal fuel cost has gone up now to maintain same steam production rate required in plant. Table is showing lowest calorific heat per rupee in case of Lignite but our project activity aims at reducing GHG emission and hence avoiding any use of fossil fuel. Hence there is investment barrier and revenue from CDM can accommodate them.

(**b) Technological barrier:** A less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions.

Less advanced technological alternative to the project activity is to continue with coal, which involves much lower risk as performance certainty is very high since the boiler operates with this fuel since long. Market share of proposed technology is very low compared to coal technology, which is a well-accepted fuel in industry, and having no availability issue. Bagass or other agrowaste usage for steam generation is less in numbers as compared to coal. In the long term continuous supply of sufficient quantities of biomass fuels is not assured over the lifetime of the plant & hence risk due to hindrance in operation because of unavailability of agrowaste is high as compared to coal. If proper care is not taken and inventory of raw material & biomass based agrowaste is not planned then interruptions due to short supply of agrowaste may occur any time throughout the year. This risk is particularly high during the rainy season.

Barrier for agrowaste supply:

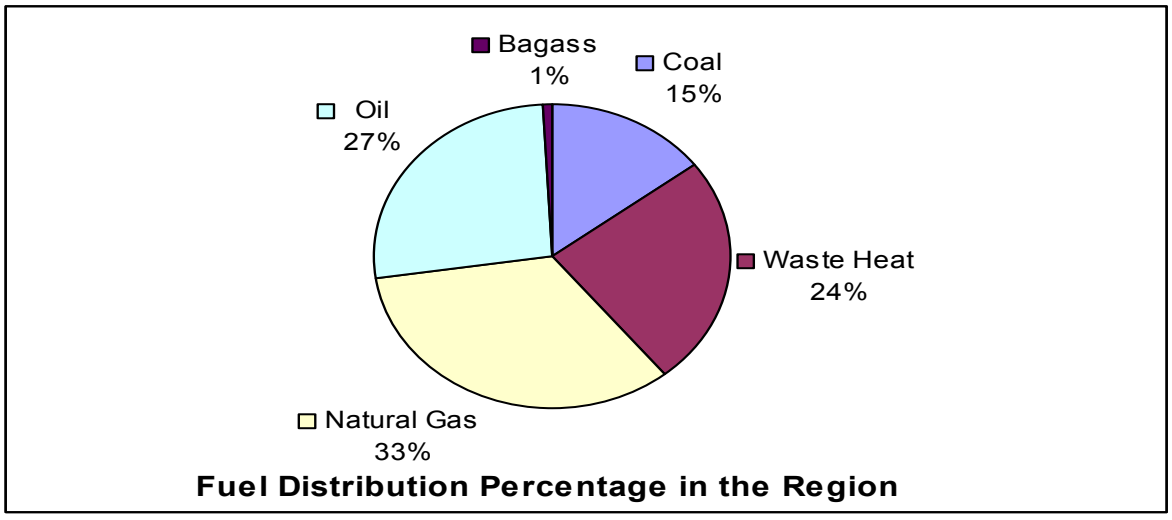
The price of agrowaste such as bagass, briquette or rice husk is very sensitive to the project. If the biomass cost is too high, the project may fail. Although there is sufficient sugarcane production in local areas, bagass supply may get affected if production of sugarcane gets hampered due to any of the natural calamities such as very low rainfall. Due to rain biomass collection process will get affected and production of briquette will cost more. Hence cost of storage and transportation gets affected with high uncertainties. For example, with the increase of the petrol or diesel oil price, the biomass or agrowaste transportation cost may ascend which will ultimately affect agrowaste price. At the same time, the management of agrowaste supply will involve farmers, sugar companies, rice mills, briquette manufacturing companies, and transportation; hence the cost of management is comparatively high. All the above factors will make the agrowaste price go up, which will influence the payoff capability of the project whereas the revenues from CDM can reduce the risk of the agrowaste price.

Operational Risk

The key technology adopted by the project is the renewable agrowaste-fired boiler. With this technology, the project is possible to acquire more advanced technology but lower efficiency of boiler has technological risk also. Skilled and/or trained staffs are lacked to operate and maintain the facility. The project owner has lack of experiences for operation and maintenance, without similar project for reference; there are many uncertain risks during the operation. The CDM revenue can be used as a guarantee fund for the operation and maintenance and technical staffs training thus enable the project to overcome the technological barriers.

(**c) <u>Barrier due to prevailing practice</u>:** Prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions
Project proponent has carried out survey in surrounding region to find out fuel practices maintained in the boiler. Surrounding region mainly include Baroda, Bharuch and Narmada district.

Fuel	No. of Boilers	percentage
Coal	63	14.7%
Waste Heat	105	24.42%
Natural Gas	145	33.72%
Oil	114	26.51%
Bagass	3	0.70%
Total	**430**	**100.0%**



Prevailing practice in the region is to use RFO, Gas or coal for steam generation. Majority of boilers in the region are RFO, Gas or coal fired. Above chart shows only 1% of boilers using bagass or biomass in the region compared to coal which is used in 15% of the boilers in surrounding region. Since the agrowaste fired boiler technology is comparatively new, converting from coal to agrowaste like bagass or briquette requires investment, leadership and initiative to change the trend. The baseline adopted in this project is based on the fact that in absence of this project Machhar Polymer would have continued operating its boiler on coal following the prevailing practices in the plant and in region. As the majority of boilers in the region are operating on coal, thus the project activity is not the baseline scenario and estimated emission reductions would not occur in the absence of the project activity.

(d)Other barriers: Since the agrowaste or biomass fired boiler technology is comparatively a new concept, the situation may arise that there is a short supply of biomass. In such emergency situation coal fired boilers which are kept as stand-by (in normal operation), would be operated to meet the steam demand.
Barriers due to technological acceptance, risk of agrowaste availability, prevailing practices and regulatory circumstances would have led continuation of coal usage, which emits higher GHG emissions. Furthermore, without the project activity, the market for biomass-based agrowaste would be much smaller, and the manufacturers would have to find other alternative for disposal.

The proposed project activity is additional due to these barriers.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

1. Baseline Emissions:

As described in the item B.4, the proposed baseline is the GHG emissions that would have occurred due to use of coal in the boiler in absence of this project activity. Baseline emissions are calculated based on the heat content of steam generated by the boiler. Equivalent GHG emission due to steam generation by the boiler in the absence of the project activity is calculated.

Baseline calculation as per Paragraph 10 of "Type AMS. I. C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" of Appendix B of the simplified M&P for small-scale CDM project activities:

For steam/heat produced using fossil fuels the baseline emissions are calculated as follows:

$$BEy = HGy * EF\ CO_2 / \eta th \quad \text{(Eq. 1)}$$

Where:

BEy---------- the baseline emissions from steam/heat displaced by the project activity during the year y in tCO_2e.

HGy---------- the net quantity of steam/heat supplied by the project activity during the year y in TJ.

$EFCO_2$ --------the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO_2 / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.

ηth---------- the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

HGy = (tons of steam generated per year) x (heat content in the steam in TJ/Tons)

Tons of steam generated per year = (Amount of steam generated in Tones/day) x (Number of working days)

Heat content of steam at particular pressure = (Enthalpy of steam in J/Kg) x (Kg of steam generated)

$BEy = HGy \times EF\ CO_2 / \eta th$
$= HGy \times 96.1 / 0.82$

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

(Copy this table for each data and parameter)

Data / Parameter:	CO_2 emission factor for Coal
Data unit:	TCO_2/TJ
Description:	Qty of CO_2 emitted in tones per TJ of energy generated by burning of Coal.
Source of data used:	Volume 2 of 2006 IPCC guidelines for National Greenhouse Gas Inventories
Value applied:	96.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	Machhar Polymer is basically a manufacturing industry. Therefore CO_2 emission factor has been chosen from the Default emission factors for Stationary combustion in Manufacturing Industries.
Any comment:	Referring table 2.3 of chapter 2 of volume 2 of 2006 IPCC guidelines, value for CO_2 emission factor for coal is 96100 $KgCO_2/TJ$, which is equal to 96.1 TCO_2/TJ

Data / Parameter:	Efficiency of coal Fired boiler
Data unit:	%
Description:	Ratio of heat output to the heat input
Source of data used:	Maximum Design Efficiency from supplier.
Value applied:	82
Justification of the choice of data or description of measurement methods and procedures actually applied :	To evaluate the equivalent coal consumption
Any comment:	-

Data / Parameter:	Enthalpy of steam
Data unit:	Joule/Kg
Description:	Heat content of Steam generated per Kg
Source of data used:	www.spirexsarco.com/resources/steam-table
Value applied:	2.782×10^6
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is taken from authentic source
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

1. Baseline Emissions:

Referring to Eq. 1, Baseline emissions are calculated as:

$$BEy = HGy * EF\ CO2 / \eta th$$

BEy : the baseline emissions from steam/heat displaced by the project activity during the year y in tCO2e.

HGy : the net quantity of steam/heat supplied by the project activity during the year y in TJ.

ηth : the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

HGy = (tons of steam generated per year) x (heat content in the steam in TJ/Tons)

(Calculations are based on design parameters)
Amount of steam generated at 10.54 Kg/cm^2 per year = 25200 Tons

Heat content of steam at 10.54 Kg/cm2 = 2.782×10^6 J/Kg
= 2.782×10^{-3} TJ/Tons

HGy = $25200 \times 2.782 \times 10^{-3}$
= 70.11 TJ

Net Heat generated by steam per year = $25200 \times 2.782 \times 10^{-3}$
= 70.11TJ/ yr

EF = 96.1 Tons/TJ

Efficiency of Coal fired boiler = 82%

Therefore,
BEy = 70.11 x 96.1/0.8
= 8216 TCO_2-e/ year

2. Project Emissions:

A) Project emission due to possible use of coal in standby boiler.

Standby boiler will be used during maintenance work of 4TPH boiler. Here calculation is done without considering any coal consumption in boiler.

Quantity of coal used in boiler = 0 KT/year

Weighted average mass fraction of carbon in coal = 25.8 t C/KT
CO_2 emission coefficient for coal, (COEFcoal,y) = (weighted average mass fraction of coal) x 44/12
= 25.8 x 44/12
= 94.6 tCO_2/KT

Hence CO_2 emission from coal = (Quantity of coal used in boiler) x CO_2 emission coefficient for coal, (COEFcoal,y)

= 0 x 94.6
= 0 tCO_2/year

Total Project Activity Emission = 0 **tCO_2-e/Year**

3. Leakages:

Paragraph 17 of "AMS I.C. Thermal energy for the user with or without electricity (Version 13: Valid from 28 March, 2008 onwards)" states that

"17. 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."

In the project activity, there is no transfer of energy generating equipment from another activity and no transfer of the existing equipment to another activity hence no leakage is considered.

4. Emission reductions:

Emission reduction due to the project activity is the difference between baseline emissions & project activity emissions.

Emission reductions due to the project activity = Baseline emissions – Project activity emissions

Emission reductions due to the project activity = (8216 – 0)
= 8216 TCO_2-e/year

Emission reductions due to the project activity = **8216 TCO_2-e/year (On design Parameters)**

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

It is to be noted that as the operating conditions are going to be same for the whole crediting year, the fuel consumption will be same for the next years as that of the current year. Therefore it is considered that the emissions will also be the same as per the current year for the next years.

On applying the formulae, the values are as follows:

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)
Year 2009	0	8216	0	8216
Year 2010	0	8216	0	8216
Year 2011	0	8216	0	8216
Year 2012	0	8216	0	8216
Year 2013	0	8216	0	8216
Year 2014	0	8216	0	8216
Year 2015	0	8216	0	8216
Year 2016	0	8216	0	8216
Year 2017	0	8216	0	8216
Year 2018	0	8216	0	8216
Total (tonnes of CO_2e)	**00**	**82160**	**0**	**82160**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	Bagass
Data unit:	KT/year
Description:	Quantity of bagass consumed per year calculated as per the Design parameter.
Source of data to be used:	Boiler log sheets maintained at the Machhar Polymer Pvt. Ltd.
Value of data	9.912
Description of measurement methods and procedures to be applied:	Electronic weighing balance is used to measure the bagass quantity at the time of quantity receipt in the truck load at Machhar polymer. Monthly bagass consumption is measured by the physical stock in hand subtracted from opening stock purchase quantity record maintained at Machhar office.

QA/QC procedures to be applied:	Quantity of bagass consumption is monitored by using calibrated weighing scale operated by third party. Receipt of same is maintained at Machhar Polymer.
Any comment:	The data monitored will be archived in Logbook (Paper) for 3 years and Spread sheet (Electronic) for 12 years.

Data / Parameter:	Briquette
Data unit:	KT/year
Description:	Quantity of briquettes consumed per day
Source of data to be used:	Boiler log sheets maintained at the Machhar Polymer, Karjan
Value of data	---
Description of measurement methods and procedures to be applied:	Electronic weighing balance is used to measure the briquette quantity at the time of quantity receipt in the truck load at Machhar polymer. Monthly briquette consumption is measured by the physical stock in hand subtracted from opening stock purchase quantity record maintained at Machhar office.
QA/QC procedures to be applied:	Quantity of briquette consumption is monitored by using calibrated weighing scale operated by third party. Receipt of same is maintained at Machhar Polymer.
Any comment:	The data monitored will be archived in Logbook (Paper) for 3 years and Spread sheet (Electronic) for 12 years.

Data / Parameter:	Bagass (NCV)
Data unit:	Kcal/Kg
Description:	NCV of Bagass
Source of data to be used:	Test records maintained at Machhar Polymer Pvt. Ltd.
Value of data	2250
Description of measurement methods and procedures to be applied:	Values obtained from test records from accredited laboratory.
QA/QC procedures to be applied:	Sample of bagass should be sent quarterly to accredited laboratory for measurement of GCV & NCV of bagass & Verification should be done from bagass purchase invoices
Any comment:	The data monitored will be archive in Logbook (Paper) for 3 years and Spread sheet (Electronic) for 12 years.

Data / Parameter:	Briquette (NCV)
Data unit:	Kcal/Kg
Description:	NCV of briquettes
Source of data to be used:	Test records maintained at Machhar Polymer Pvt. Limited.

Value of data	3800
Description of measurement methods and procedures to be applied:	Values obtained from test records from accredited laboratory & verified from briquette purchase invoices
QA/QC procedures to be applied:	Sample of briquettes should be sent quarterly to accredited laboratory for measurement of GCV & NCV of briquettes & Verification should be done from briquette purchase invoices
Any comment:	The data monitored will be archived in Logbook (Paper) for 3 years and Spread sheet (Electronic) for 12 years.

Data / Parameter:	SG
Data unit:	T/yr
Description:	Quantity of steam generated per year calculated as per the Design parameter.
Source of data to be used:	Boiler log sheet maintained at Machhar Polymer Pvt. Ltd.
Value of data	25200
Description of measurement methods and procedures to be applied:	By BEE Certified Energy Auditor
QA/QC procedures to be applied:	Steam generation will be metered daily with the help of cumulative meter which is to be installed to take project performance review.
Any comment:	The data monitored will be archived in Logbook (Paper) for 3 years and Spread sheet (Electronic) for 12 years.

Data / Parameter:	P_s
Data unit:	Kg/cm^2
Description:	Pressure of the steam generated.
Source of data to be used:	Boiler log sheet maintained at Machhar Polymer
Value of data	10.54
Description of measurement methods and procedures to be applied:	Pressure of the steam generated will be monitored with the help of pressure gauge.
QA/QC procedures to be applied:	Pressure measuring instrument will be calibrated twice in a year to check its degree of accuracy.
Any comment:	The data monitored will be archived in Logbook (Paper) for 3 years and Spread sheet (Electronic) for 12 years.

B.7.2 Description of the monitoring plan:

In this project activity, as per paragraph 18 of "Type-I, AMS. I.C. Thermal energy for the user with or without electricity (Version 13: Valid from 28th March, 2008 onwards)", energy generated due to firing of biomass (a renewable energy source) is quantified. To verify reduction in GHG emission, the monitoring has to ensure that the quantity of steam and heat generation is consistent with baseline steam and heat generation.

The data monitoring will involve:

1. Quarterly evaluation of GCV & NCV of bagass, briquette, rice husk or other renewable fuel used in project activity.
2. Monthly evaluation of Evaporation Ratio (to measure quantity of steam generated per kg of biomass consumption)
3. Metering of Steam Generation to measure quantity of steam generated on shift basis. Also actual steam generated will be measured for different fuel.
4. Recording monthly agrowaste consumption, similar to the lines of monitoring coal Consumption
5. Recording flue gas temperature as well as steam pressure on hour basis.

For measurement of all the parameters and maintenance of records due care has been taken and to prepare elaborated formats for data collection; methodology has been described for measurement and collection of each of the parameter; proper training is being provided to concerned personnel; other instruments such as steam flow meter are calibrated; and verification of the data, measurements and tests shall be carried out by Certified Energy Auditor.

Machhar Polymer has laid down the methodology to estimate the steam generation. Evaporation ratio is monitored on monthly basis. BEE certified energy auditors would evaluate necessary data to calculate evaporation ratio once in a month.

Accredited laboratory will monitor the GCV &NCV of biomass or agrowaste once in a quarter. Flue gas temperature will be monitored by the qualified and trained operator/engineer on hour basis. Certified energy auditors will verify the data.

Quality Control & Quality Assurance Procedures identified for data monitoring are explained in detail in Annex 4.

The operational and management structure basically consists of three levels:

A. Project Owner
B. Project Manager
C. Project Operator

A. Project Owner:

The project owner represents the project activity, which is Machhar Polymer Management.

Their specific responsibilities:

1. Handling of the project performances
2. Keeping the bills for fuel consumption or invoices for fuel purchase

3. Providing annually copies of fuel bills or invoices for fuel purchase to Project Operator for verification of the biomass quantity

B. Project Manager: Works Manager, Machhar Polymer, Karjan Dist. Baroda (Gujarat), India

His specific responsibilities:

1. Appointment of Project Operators
2. Ensure that Project Operators have undergone initial training to raise awareness about the process
3. Assure that the Project Operators have received proper training regarding the process
4. Submission of the annual monitoring report for verification to the Designated Operational Entity (DOE)

C. Project Operators, at Machhar Polymer, Karjan: (biomass based agrowaste storage and boiler operation)

Their specific responsibilities:

1. Collect/Monitor the necessary data as required by the monitoring methodology
2. Store the collected/monitored data in log book (paper) and spread sheet (electronic)
3. Keep the record of collected/monitored data in a log book for at least three years and in a spread sheet for at least 12 years
4. Ensure that the data is entered properly and take proper care to avoid any loss of information
5. Prepare the annual monitoring report
6. Check that CER calculation is carried out as per the monitoring methodology
7. Submit the annual monitoring report to the Project Manager

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 the baseline section & monitoring methodology:

21st May 2008

Name of person/entity determining the baseline:

Mr. V.D.Somvanshi,
Technical Director,
Machhar Polymer Pvt. Ltd,
39, Juni Jithardi Village Road, Near Karjan Town,
Dist. Baroda, Gujarat (India).

Email: somvanshi@machhar.com

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

The starting date of the project is 18 July 2006

C.1.2. Expected operational lifetime of the project activity:

10 Years 0 Months

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

Fixed crediting period is selected.

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:

C.2.2.1. Starting date:

01/01/2009

C.2.2.2. Length:

10 Years

SECTION D. Environmental impacts

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

Environmental impact assessment for such type of projects is not required by the existing regulations in India. The intended philosophy of this project activity is based on the concept of providing sustainable energy with minimum impacts on the environment. Since the project activity uses biomass-based agrowaste as a fuel for steam production, it does not lead to green house gases. It also results in lesser emission of other pollutants like carbon mono-oxide, SOx and NOx into the atmosphere. The project has no significant effect on water or air pollution. However the project is conserving fossil fuels. The waste produced due to burning of agrowaste i.e. ash is being used for land-filling in nearby areas. Thus it can be concluded that the project activity has no significant negative impacts on the environment.

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 does not have any significant negative environmental impact. Therefore the environmental impact assessment undertaken in accordance with the procedures as required by the host Party is not necessary for this project.

SECTION E. Stakeholders' comments

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

A survey was done to gather local stakeholders' comments on fuel switching in boiler project at Machhar Polymer Pvt. Ltd.

As per the notice dated 19 October 2007 regarding the meeting with the local community on 26th October 2007, following member were present at 39 Juni Jithardi Village Road, Taluka Karjan.

People from Local Community

Name of the Person	Occupation	Area Belong to	Signature
Atul Bhai Metha	Shopkeeper	Karjan	
Chandrakant J. Patel	Service	Dhavat	
J.H. Patel	Farmer	Juni Jithardi	
Jagdishbhai Pandya	Retired	Karjan	
Kamlesh Patel	Electrical Contractor	Karjan	
Kishosingh Atalia	Farmer	Karjan	
Koushik Bhai Patel	Taluka Pramukh BJP	Karjan	
Mukesh Bhai Patel	X-Surpanch	Juni Jithardi	
Nikul Patel	Shopkeeper	Karjan	
Pankaj Mehta	Builder	Karjan	
Purshotamdas Patel	Shopkeeper	Juni Jithardi	
Ramesh Vassva	Farmer	Juni Jithardi	
Rameshbhai Dabhi	Farmer	Karjan	
Ranjit Vassva	Service	Juni Jithardi	
Suresh R Vassva	Service	Juni Jithardi	
Chandubhai P. Chouhan	Farmer	Karjan	
Chandubhai Atalia	Farmer	Karjan	
Raju B Chavda	Farmer	Karjan	

Persons present from Machhar Polymer Pvt. Ltd.

Name of the Person	Occupation	Area Belong to	Signature
V.D. Somvanshi	Technical Director	Baroda	
Nawal B Sharma	Accounts Manager	Baroda	
S.S. Yadav	Manager P & A	Baroda	

Meeting started at conference room of the Machhar Polymer Pvt. Ltd. 39 Juni Jithardi Village Road, Taluka Karjan Baroda at 11:30 AM on 26-10-2007.

Mr. S.S. Yadav conducted the meeting and begun short Introduction about the member present as per the above table and brief about the project to the member present in the meeting.

Mr. Nawal B Sharma address to members on topics at 12:00 PM about the project as under.

Brief about the Project: - As per Title Letter "Brief Description of the Project."
How the Project Work: Mean of CDM (Clean Development Mechanism), UNFCCC, etc.
Project Benefit: Lowering Pollutions**,** Heat Recovery,

Mr. V. D. Somvanshi addressed to the members Present in the meeting at 13:30 afternoon about technical aspect of the project, How the project lowering Pollution, Mean of GHG (Green House Gases)

At 14:00 Pm Session for Question & Answer Started.

General Question asks by the members are:-

Q.1 how you prevent small particles of bagasse flew in the air during the transportation on the road which may trouble people's eye while riding on road and cause of an accident?

Answer Given by V. D. Somvanshi- During the transportation bagasse will be cover by a tarpoline being this there is no small particles of bagasse flew in air and harm to any person. The required precaution already implemented.

Q.2 How can you say bagasse is lowering the pollutions rather then coal please tells us?

Answer Given by V.D. Somvanshi- that burning of 1 ton coal is emitting 1.8 ton CO_2 in the atmosphere where Bagasse we get from sugarcane while sugarcane growing in farm house its take CO_2 from the atmosphere to grow. Hence we can say it is balancing the nature property by using CO_2 while coal burning is only adding CO_2 in the atmosphere.

Q.3 How this project is beneficial for the people of local region?

Answer given by V.D. Somvanshi- Earlier we were using coal for our fuel requirement, which were getting directly from dealer, coal mines or import of coal mainly. Now bagasse we are getting from sugar factory in the region will benefited to the people by the way of new job opportunity in the region, Secondly volumetric consumption of bagasse by the unit will create job for people of the reason directly or indirectly. Local people find opportunity for Job as a transporter, as a worker for handling the bagasse loading and unloading etc.

Q.4 Have you made proper arrangement for storage of bagasse for your requirement if any please specify in brief?

Answer given by V.D. Somvanshi- We have erected a huge teen-shed to store bagasse in a factory area and 5 bigha land taken on lease/ rented basis for volume storage of bagasse which is 4 Km away from unit and locality of town area. We have an arrangement to cover the bagasse by huge tarpoline which is used in ship and also using covered vehicle during transport of bagasse from plot to unit.

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

Since all comments were positive and supportive to the project, no reaction was required. Still due care has been taken to ensure that emission of SPM is properly controlled.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Machhar Polymer Pvt. Ltd.
Street/P.O.Box:	39, Juni Jithardi Village Road
Building:	
City:	Taluka Karjan, Dist. Baroda,
State/Region:	Gujarat
Postfix/ZIP:	
Country:	INDIA
Telephone:	Fact : [+91-2666]-232850/893/1893
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	Technical Director
Salutation:	Mr.
Last Name:	Somvanshi
Middle Name:	Dnyanoba
First Name:	Vithal
Department:	-
Mobile:	91-9328046769
Direct FAX:	[+91-2666]-232893
Direct tel:	Office : [+91-240]-2334451, 2321092
Personal E-Mail:	somvanshi@machhar.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No funds from national or international public sources are used for any activity in the proposed project. Machhar Polymer Pvt. Ltd. Karjan, Baroda. India shall meet all project expenses.

Annex 3

BASELINE INFORMATION

The proposed baseline is the GHG emissions that would have occurred due to use of coal in the boiler in absence of this project activity. Baseline emissions are calculated based on the heat content of steam generated by the boiler. Equivalent GHG emission due to steam generation by the boiler in the absence of the project activity is calculated.

Baseline calculation as per Paragraph 10 of "Type-I, AMS. I. C. Thermal energy for the user with or without electricity (Version 13: Valid from 28th March, 2008 onwards)" of Appendix B of the simplified M&P for small-scale CDM project activities:

Baseline emissions are estimated as follows:

For steam/heat produced using fossil fuels the baseline emissions are calculated as follows:

$$\mathbf{BEy = HGy * EF\ CO_2 / \eta th} \quad \text{(Eq. 1)}$$

Where:

BEy----------the baseline emissions from steam/heat displaced by the project activity during the year y in tCO_2e.

HGy---------- the net quantity of steam/heat supplied by the project activity during the year y in TJ.

$EFCO_2$ ----------the CO2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO2 / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.

ηth- ----------the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

HGy = (tons of steam generated per year) x (heat content in the steam in TJ/Tons)

Tons of steam generated per year = (Amount of steam generated in Tones) x (Number of working days)

Heat content of steam at particular pressure = (Enthalpy of steam in J/Kg) x (Kg of steam generated)

HGy = (Enthalpy of steam in J/Kg) x (Kg of steam generated)

BEy = HGy x EF CO_2 /ηth
= HGy x 96.1 /0.82

References:

CO_2 emission Coefficient for Coal in TCO_2/TJ

(Referring Table 2.3, page 2.18 of Chapter 2 of Volume 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories,
CO_2 Emission Factor for Coal = 96100 Kg/TJ
Therefore CO_2 Emission Factor for Coal is = 96.1 T/TJ

Enthalpy of steam:

Referring to www.spirexsarco.com/resources/steam-table
Enthalpy of Steam at 10.54 kg/cm^2 pressure = 2782000 J/kg

Annex 4

MONITORING INFORMATION

In this project activity, as per paragraph 18 of "Type-I, AMS. I.C. Thermal energy for the user with or without electricity (Version 13 Valid from 28 March 08 onwards)", energy generated due to firing of biomass (a renewable energy source) is quantified. To verify reduction in GHG emission, the monitoring has to ensure that the quantity of steam and heat generation is consistent with baseline steam and heat generation.

The data monitoring will involve:

1. Quarterly evaluation of GCV & NCV of bagass, briquette, rice husk or other renewable fuel used in project activity.
2. Monthly evaluation of Evaporation Ratio (to measure quantity of steam generated per kg of biomass consumption)
3. Metering of Steam Generation to measure quantity of steam generated on shift basis. Also actual steam generated will be measured for different fuel.

4. Recording monthly agrowaste consumption, similar to the lines of monitoring coal Consumption
5. Recording flue gas temperature as well as steam pressure on hour basis.

Qualitative explanation regarding quality control & quality assurance procedures that have been undertaken:

Procedures identified for maintenance of steam generation system (boiler + furnace):

At Machhar Polymer when the boiler is shut down for maintenance purposes, standby coal fired smoke tube boiler will fulfill steam requirement. The maintenance agency identified by Machhar Polymer is technology provider and their team is fully trained for maintenance.

Procedures identified for monitoring, measurements & reporting:

Quantity of biomass received is measured by monitoring the receipt of each type of fuel quantity in truckloads through external electronic weighing balance.

The annual monitoring report should be worked out. It will be submitted to DOE. The report will be archived to make it available for the external audit & verification purposes.

Procedures identified for dealing with possible monitoring data adjustments and uncertainties:

The important parameter in calculating project emissions is biomass consumption. Biomass consumption is metered continuously by external electronic weighing balance as well as weighbridge at Machhar Polymer.

Procedures identified for internal audits of GHG project compliance with operational requirements as applicable:

In order to check the project's compliance with operational requirements, internal audit can be carried out. For this purpose, a team will be formed under the supervision of the Project Manager.

Procedures identified for day-to-day record handling (including what records to keep, storage area of records and how to process performance documentation):

Procedures identified for day-to-day record handling are as follows:

1. Daily record of quantity of the biomass consumed should be maintained properly in the format provided.
2. Records of the parameters that are monitored monthly and quarterly should be maintained properly in the format provided.
3. All these records should be placed properly at the place provided.
4. Performance parameters are to be monitored by the outside accredited agencies. Monitored data should be collected from the agencies and stored properly for further reference.

Procedures identified for Project performance reviews:

Project performance depends upon performance parameters like Evaporation ratio, efficiency of boiler, quantity of steam generation, etc. For reviewing project performance, following procedures are identified:

1. Evaporation ratio (EVR) is calculated on monthly basis, which will be checked whether it is in line with the optimum or not.
2. Boiler efficiency is calculated quarterly once so as to check whether it is line with monitoring methodology requirements.
3. Steam generation (SG) is metered on monthly basis to take project performance review.

Procedures identified for corrective action:

If any of the performance parameter monitored above is not found as per the monitoring methodology then the following corrective actions shall be taken:

1. Operating procedures will be reviewed.
2. System (Boiler) will be checked whether it is in proper working condition or not.
3. Check that the data monitoring is properly done or not.
4. If necessary, changes should be made accordingly in the emission calculation workbook

Procedures identified for training:

Training procedures identified are as follows:

Initial training is given to the project operators to create awareness about the project activity.
Detailed training should be given to the project operators including:
1) Information about data to be collected/monitored and its quality
2) Proper data collecting/ monitoring procedure
3) Correct data entry procedures.
4) Maintenance of data records in logbook and spreadsheet
5) Proper storage of data records
6) Emission reduction calculation as provided in the emission calculation workbook
7) Checking whether the emission reduction is as per the monitoring methodology or not

8) Preparation of annual monitoring report

Machhar Polymer will appoint agency for training of monitoring personnel with respect to monitoring of all parameters to be checked at Machhar Polymer & CER calculation. This agency will carry out training program-giving details about data to be monitored, correct ways of data monitoring & CER calculation procedure. The agency will itself do data monitoring & perform the CER calculation accordingly during the training of the monitoring personnel. The maintenance agency identified by Machhar Polymer is the Technology provider and their team is fully trained for training activities.

Annex 5

LIST OF REFERENCES

Sr.	Particulars of the references
1.	Website of United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int
2.	Annex II Simplified modalities and procedures for small-scale clean development mechanism project activities
3.	Clean Development Mechanism Simplified Project Design Document For Small Scale Project Activities (SSC-PDD) [Version 03: 22 December 2006], UNFCCC
4.	Small-Scale Methodology AMS I.C. [Version 13 Valid from 28 March 2008 onwards], UNFCCC
5.	Guidelines for completing the Simplified Project Design Document (CDM-SSC-PDD), The form for submissions on methodologies for Small-Scale CDM Project Activities (F-CDM-SSC-Subm) and the form for submission of Bundled Small-Scale CDM Project Activities (F-CDM-SSC-BUNDLE) [Version 04: 22 December 2006]
6.	Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities
7.	Baseline Carbon Dioxide Emission Database Version 2.0 – LATEST from Central Electricity Authority (CEA) website is referred. http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
8.	2006 IPCC Guidelines for National Greenhouse Gas Inventories

NOTATIONS

Notation	Representing	Unit
%	Percentage	
^0C	Degree Celsius	
BEE	Bureau of Energy Efficiency	
BEy	The net quantity of steam/heat supplied by the project activity during the year y	TJ
Bagass	Bagass Consumption	KT/year
Briquette	Briquette Consumption	KT/year
BH	Net Heat Generated by Biomass Consumption	TJ/year
(GCV)	GCV of Biomass	Kcal/Kg
(NCV)	NCV of biomass	Kcal/Kg
	Quantity of Bagass	Tonnes
CDM	Clean Development Mechanism	
CEA	Central Electricity Authority	
CER	Certified Emissions Reduction	
CH_4	Methane	
CO	Carbon Monoxide	Ppm
CO_2	Carbon-di-oxide	
CO_2-e	CO_2 equivalent	TCO_2-e
DNA	Designated National Authority	
DOE	Designated Operational Entity	
Eq	Equation	
Coal-e (yr)	Equivalent Coal Consumption per year	KT
CH-e (yr)	Net Heat generated by Equivalent Coal Consumption	TJ/year
GCV	Gross Calorific Value	Kcal/kg
GHG	Green House Gas	
GHG (yr)	GHG Emissions due to burning of Coal in boiler	TCO_2-e/year
GHG Emissions	Green House Gas Emissions	TCO_2-e/year
Gm/cc	Gram Per Cubic Centimeter	
HGy	The net quantity of steam/heat supplied by the project activity during the year y	TJ
IPCC	Intergovernmental Panel on Climate Change	
Kcal/hr	Kilo Calorie Per Hour	
Kcal/kg	Kilo Calorie Per Kilo Gram	
Kcal/lit	Kilo Calorie Per Liter	
KG	Kilo Gram	
Kg CO_2equ/kWh	Kilogram of CO_2 equivalent per Kilo Watt Hour	
EVR	Evaporation ratio	Kg/Kg
Kg/cm^2	Kilogram Per Square Centimeter	
Kg/h	Kilogram Per hour	

Kg/hr	Kilogram Per Hour	
Kg/Kg	Kilogram Per Kilogram	
Kg/liter	Kilogram Per Liter	
Kg/TJ	Kilogram Per Tera Joule	
KL	Kilo Liter	
KL/day	Kilo Liter Per Day	
Km	Kilometer	
KT	Kilo Ton	
KT/day	Kilo Ton Per Day	
KT/year	Kilo Ton Per Year	
KW	Kilo Watt	
KWh	Kilo Watt hour	
KWh/MT	Kilo Watt Per Metric Ton	
KWh/ton	Kilo Watt Per Ton	
Liter/hr	Liter Per Hour	
M	Meter	
M & P	Modalities and Procedures	
m^2	Square Meter	
Max.	Maximum	
Mg/ NM^3	Milligram Per Normal Cubic Meter	
Mg/cm^3	Milligram Per Normal Cubic Centimeter	
GPCB	Gujarat Pollution Control Board	
MT	Metric Ton	
MT/acre	Metric Ton Per Acre	
MT/hr	Metric Ton Per Hour	
MW	Mega Watt	
N_2O	Nitrous Oxide	
NCV	Net Calorific Value	
No.	Number	
Nos	Numbers	
NO_x	Oxides of Nitrogen	
PDD	Project Design Document	
ppm	Part Per Million	
Qty	Quantity	
SG	Steam generation	T/day
SO_x	Oxides of Sulphur	
SPM	Suspended Particulate Matter	Mg/Nm^3
T	Ton	
T CO_2-e	Tonnes of CO_2 equivalent	
T/day	Ton Per Day	
T/hr	Ton Per Hour	

T/TJ	Ton Per Tera Joule	
TC/ TJ	Tonnes of Carbon Per Tera Joule	
TCH_4/TJ	Tonnes of Methane Per Tera Joule	
TCO_2/TCH_4	Tonnes of CO_2 Per Tonne of Methane	
TCO_2/TN_2O	Tonnes of CO_2 Per Tonne of Nitrous Oxide	
TCO_2-e	Tonnes of CO_2 equivalent	
TCO_2-e/MWh	Tonnes of CO_2 equivalent Per Mega Watt Hour	
T-CO_2-e/TJ	Tonnes of CO_2 equivalent Per Tera Joule	
Tfg	Flue gas Temperature	Degree Celsius
TJ	Tera Joule	
TJ/KT	Tera Joule Per Kilo Ton	
TJ/year	Tera Joule Per Year	
TN_2O/TJ	Tonnes of Nitrous Oxide Per Tera Joule	
TPD	Tonnes Per Day	
TPH	Tonnes Per Hour	
UNFCCC	United Nations Framework Convention on Climate Change	
Yr.	Year	
$\eta_{B\text{-}Biomass}$	Efficiency of biomass Fired Boiler	%
$\eta_{B\text{-}coal}$	Efficiency of coal Fired Boiler	%
ηth	The efficiency of the plant using fossil fuel that would have been used in the absence of the project activity	%