



**CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006**

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**SECTION A. General description of project activity****A.1 Title of the project activity:**

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“34 MW Bagasse based Cogeneration Project of Mankapur Chinni Mills at Uttar Pradesh” at Gonda, Uttar Pradesh by M/s Mankapur Chinni Mills

Version 02

23/01/2008

A.2. Description of the project activity:

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The proposed project activity is a 7000TCD Greenfield project in the state of Uttar Pradesh by Mankapur Chini Mills (MCM). The project is to make use of the sugar mill-generated bagasse to generate steam and electricity for internal use and to export the surplus power to the Uttar Pradesh Power Corporation Limited (UPPCL) grid. The project activity would be capable of generating 34MW power and after meeting the internal captive power requirement for the unit it will export the surplus power to the grid. It will be therefore a supplement to traditional fossil fuel based power plants in the northern region grid. As the project utilizes only bagasse (a renewable biomass) for the generation of electricity it will not only cut down the emission rate but also help conserving non-renewable fossil fuel.

The project activity is unique in India as it involves high efficiency boilers, which optimises the energy produced per unit of bagasse burned. While many sugar mills burn their bagasse wastes, very few mills sell electricity to a state grid and few bagasse cogeneration power plants have high-pressure boiler systems (87kg/cm²). The project activity is highly replicable as the country's sugar mills produce vast quantities of bagasse wastes. These could be far more efficiently burned to generate energy for on and off-site use while also reducing grid-based GHG emissions, which result from the country's overwhelming (70%) dependency on fossil fuel.

The project activity involves the installation of two boilers of a 90TPH capacity with outlet steam parameters of 87 ata and 515±5Deg.C; one extraction cum condensing turbo-generator of 22MW and one 12MW back pressure turbo-generator. The power generation in the plant will be at an 11kV level. The internal consumption requirements for the auxiliaries and the equipment of the sugar plant and the cogeneration plant will be met by stepping down the voltage level to 415 V. The exportable power will be stepped up to 132 kV and paralleled with the UPPCL grid at 132 kV. The paralleling with the UPPCL grid will be done at the UPPCL sub-station at Mankapur, which is about 8 km from the plant.

Project's contribution to sustainable development

The project activity contributes to the ‘Sustainable Development of India’ in the following ways;

- The project activity is a renewable energy power project, which will use bagasse waste generated from sugar mill as a fuel for power generation and will export clean power to a grid.
- This electricity generation would substitute the power generation by carbon intensive UPPCL grid (northern region grid), which uses carbon emissive conventional fuels like coal, diesel/oil,



natural gas etc. Thus, the project activity will reduce the CO₂ emissions and also save the conventional fuel.

- The Indian economy is highly dependent on “coal” as a fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India, and yet the basic electricity needs of a large section of the population are not always met. This results in excessive demands for electricity and places immense stress on the environment. Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of Renewable Energy (RE) sources. Since this project activity utilizes a renewable energy source, it will positively contribute to the reduction in the (demand) use of finite natural resource like coal/ oil, minimizing depletion and increasing its availability to other important processes. The project activity, by feeding clean power to a grid, will eliminate an equivalent carbon dioxide (CO₂) emission that would be the result of the production of the electricity necessary to cater to the electricity requirement. Therefore this project activity has excellent environmental benefits in terms of reduction in carbon emissions and coal resource conservation.
- This project activity is in the rural setting and will contribute to the Environmental & Social issues locally and globally by:
 - ✚ The export of power, thereby eliminating the generation of same quantity of power using conventional fuel;
 - ✚ Conserving and displacing coal, a non-renewable natural resource;
 - ✚ Increasing the diversity and reliance of local energy resources;
 - ✚ Reducing GHG emissions (Carbon Dioxide) through the avoidance of fossil fuel grid electricity generation;
 - ✚ Contributing to a small increase in the local employment in the area of skilled & unskilled jobs for the operation and the maintenance of the equipment

The project imparts a direct positive impact in improving the quality of life of the local population as it provides an inflow of funds, additional employment, technological and managerial capacity building etc. The following paragraphs illustrate briefly how the project activity contributes to the four pillars (indicators) of the sustainable development of India:

Social aspects

The location of the project in rural setting contributes towards poverty alleviation by generating both direct and indirect employment. The project makes a significant contribution to development as any rurally based industry in India provides an important source of direct employment in the surrounding area. Uttar Pradesh, where the plant is located, is one of the most populous states in India with 88% of the population located in rural areas. Therefore the provision of direct employment will provide a much-needed alternative to those situated in the locality of the plant. The sugar factory is expected to employ more than 50 in the power plant, a number of whom will be skilled boiler and turbine operators and engineers. Furthermore, the project will help bridge the gap in the demand and supply of electricity at a local and national level.

**Economic aspects**

The project's investment is to the tune of Rs. 980 million in addition to which there will be continuous inflow of funds considering CDM revenues. In the absence of the project such an inflow of funds to the region was not envisaged.

Environmental aspects

The project activity is a renewable energy cogeneration project, which uses mill-generated bagasse of sugar mill as a fuel for power generation. The CO₂ emissions of the combustion process due to burning of bagasse are consumed by the plant species, representing a cyclic process. The bagasse generation, storage and usage is governed by established system and channel to ensure no resource degradation. The plant uses state of the art control systems to minimize pollution like electrostatic precipitators, full fledged effluent treatment system etc to control the air and water discharges. Since this project activity generates green power, it has positively contributed towards the reduction in (demand) use of finite natural resource like coal/oil, minimizing depletion and in turn increasing its availability to other important purposes. Therefore this project activity has excellent environmental benefits in terms of reduction in carbon emissions and coal resource conservation.

Technological aspects

The project activity uses one of the most environmental friendly technologies of cogeneration in the renewable energy sector. The project comprises of 180 tons per hour (TPH) capacity steam generator with the outlet steam parameters of 87kg/cm² and 515°C, with 34MW capacity turbine generator set of one triple extraction cum condensing (DEC) type turbine and one back pressure turbine. The higher steam parameters result in higher annual savings of fuel per annum when compared to lesser steam parameters like the 21kg/cm² prevalent in the country.

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)
Ministry of Environment and Forest, Government of India	Mankapur Chini Mills (Private entity, project participant)	No

A.4. Technical description of the project activity:**A.4.1. Location of the project activity:**

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A.4.1.1. Host Party(ies):

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India

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



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Uttar Pradesh State

A.4.1.3. City/Town/Community etc:

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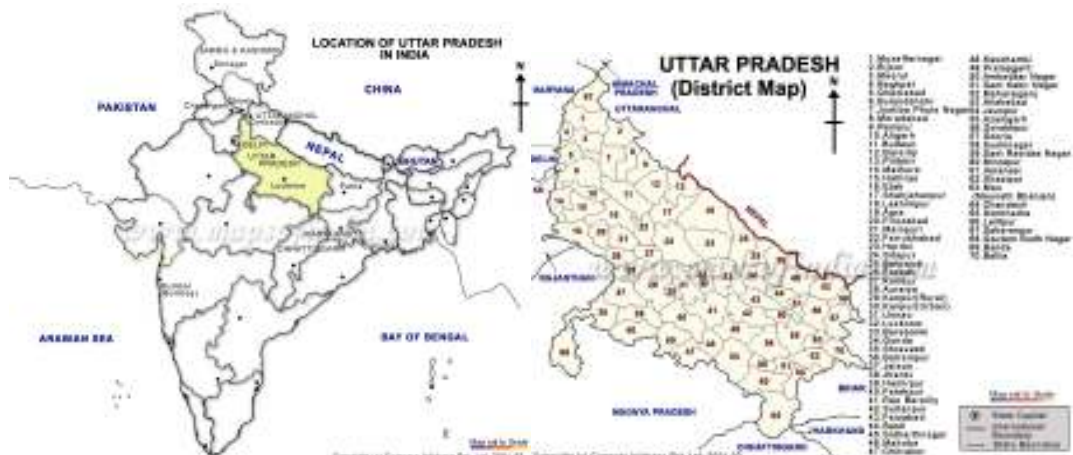
Gonda District, Mankapur Tehsil, Datauli Village

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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The CDM project is a co-generation power facility utilizing the mill-generated bagasse situated in the district of Gonda of the Uttar Pradesh state. Gonda District is well connected to important towns and cities of the country and nearby area. The physical location of the Mankapur project is 27.28°N Latitude and 82.01°E Longitude.

The location map of the project is furnished below:



Uttar Pradesh State (marked in yellow) within India, Gonda District (No: 34) within UP



Location of the project site in Mankapur village of Gonda District

A.4.2. Category(ies) of project activity:

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The present project activity will fall under the sectoral scope 1: Energy Industries (renewable / non-renewable sources)

A.4.3. Technology to be employed by the project activity:

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The project is a grid-connected bagasse based cogeneration power plant with a high-pressure steam turbine configuration. The plant is designed to operate two boilers of 90 TPH capacity with outlet steam configuration of 87 ata and $515 \pm 5^\circ\text{C}$, one extraction cum condensing turbo-generator of 22MW and one 12MW back pressure turbo-generator using bagasse as the fuel. Both boilers and turbo-generators will meet the entire process steam and power requirement for the sugar plant.

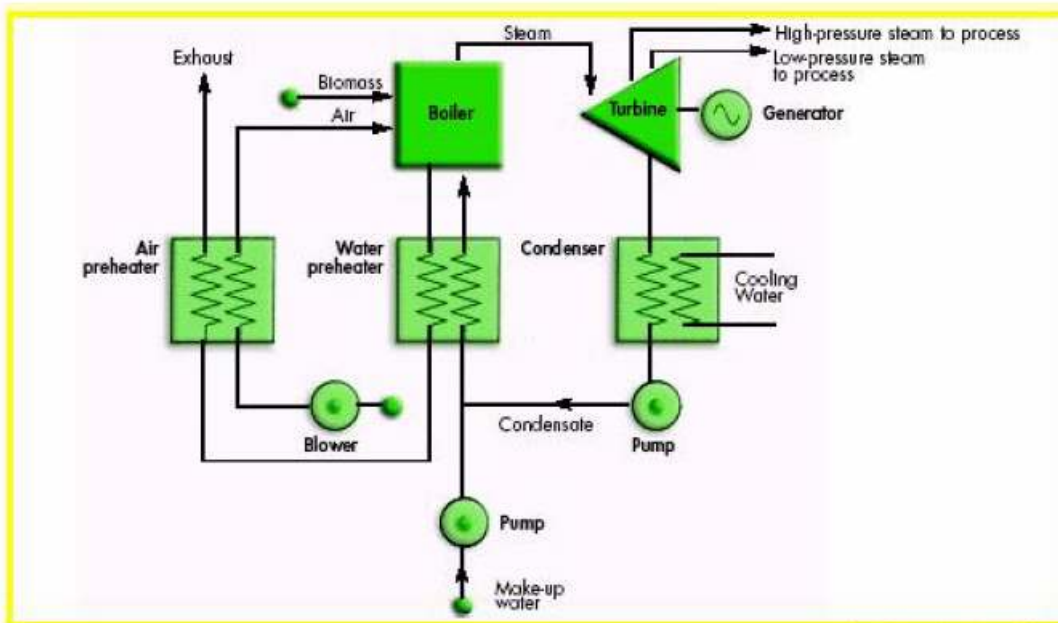
The proposed cogeneration project aims at significantly improving the energy efficiency of the sugar factory, enabling the plant to generate power from its cane crushing operations for its in-house requirements and export its surplus power to the grid. Energy efficiency and the export of power is made feasible by the employment of high pressure and high temperature steam cycles and by the utilization of the surplus bagasse to produce more steam and hence more electricity.

The plant operates around 165 days during the crushing season with the balance of about 68 off-season days. The cogeneration plant will operate during the off-season with the saved bagasse from the seasonal operation of the MCM sugar plant.



The bagasse generation in the plant would be 87.6 TPH out of this about 1.6 TPH would be used for the mixing with clarifier mud for vacuum filtering and another 1.03 TPH would be set aside as a windage and transportation loss. Hence about 84.97 TPH of bagasse will be available for the energy generation. During the season period the bagasse consumption in the boiler would be 71 TPH so every hour the net bagasse saved would be 13.97 TPH. For 165 days of season operation the net quantity of bagasse saved would be 49870 MT for off-season operations along with it the plant also procure about 80000 MT of the bagasse from the babnan unit for its operation during the off-season. However the project will not claim any CER for the procured bagasse during the off-season.

The cogeneration plant and equipment will consist of two boilers, backpressure and extraction cum condenser type turbo-generators, a cooling water system, a DM water system, a condensation system, a compressed air system and an electrical system consisting of switch gears, LT distribution panels, a step up transformer to export the power, step down transformers to meet the in-house power requirement of the sugar and power plant, an outdoor switchyard equipment, etc.



The plant is designed with all other auxiliary plant systems like:

- A bagasse handling system with storage and processing arrangements;
- High pressure feed water heaters;
- An ash handling system;
- Water treatment plants;
- A Compressed air system;
- An air conditioning system;
- Main steam, medium pressure and low pressure steam systems;
- A fire protection system;
- Water systems which include a raw water system, a circulating water system, a condensation system, a de-mineralised water system and service with potable water;



- The electrical system for its successful operation

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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The total emission reductions from the project throughout the first crediting period (7 years) are expected to be as under:

Years	Annual estimation of emission reductions in tonnes of CO2 e
2008	89,663
2009	89,663
2010	89,663
2011	89,663
2012	89,663
2013	89,663
2014	89,663
Total estimated reductions for the crediting period	627,642
Total number of crediting years	21 (7 x 3)
Annual average over the crediting period of estimated reductions (tones of CO2 e)	89,663

In the above table, the year 2008 corresponds to the period starting from 01.04.2008 to 31.03.2009. Similar interpretation shall apply for remaining years. The crediting period will start from the date of registration of the project with CDM EB.

A.4.5. Public funding of the project activity:

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Not applicable as no funding from Annex 1 based institutions have been availed of.

**SECTION B. Application of a baseline and monitoring methodology****B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:**

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The project activity follows the recently approved consolidated baseline and monitoring methodology ACM0006/version 06, EB33, “Consolidated methodology electricity generation from biomass residues”.

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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ACM0006 is applicable to biomass residue based electricity generation project activities, including cogeneration plants. MCM project activity is appropriate to this methodology because the project activity is grid connected electricity generation from bagasse (renewable biomass).

According to the chosen baseline methodology, the proposed Co-generation project complies with the applicability criteria:

“The installation of a new biomass power generation plant at a site where currently no power generation occurs (**Greenfield power projects**)”

The project activity is a Greenfield power generation project at a site where currently no power generation occurs.

No other biomass types than biomass residues are used in the project plant and these biomass residues are the predominant fuel used in the project plant:

Bagasse is a residue from sugar industry is the only type of biomass residue that is used as fuel in the project activity. No other biomass types other than bagasse are used in the project plant.

The implementation of the project shall not result in an increase of the processing capacity:

The implementation of the project activity has no direct/indirect effect on the bagasse production in the facility. The bagasse production is guided by sugar production requirements.

The biomass stored at the project facility should not be stored for more than one year:

A small portion of the bagasse of the plant is stored at the plant premises for use in the non-crushing period. This quantity of bagasse is not stored at the project facility for more than one year.

No significant energy quantities, except for the transportation of the biomass, are required to prepare the biomass residues for fuel combustion:

No significant energy quantities are required for fuel preparation.

Hence, the project activity fulfils all the applicability criteria of the methodology ACM0006.

B.3. Description of the sources and gases included in the project boundary

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As mentioned in the methodology, the boundary for which the GHG emissions are to be counted must take into account all sources of GHG emissions, that is the emissions from the transportation of biomass, from the on-site use of fossil fuels, from fossil fuel fired power plants connected to the grid and from fossil fuel based heat generation.

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid electricity generation	CO ₂	Yes	Main emission source
	Heat generation	CO ₂	No	The heat generated from the project activity claims no emission reductions.
	Uncontrolled burning or decay of surplus biomass	CH ₄	No	Emissions from uncontrolled burning or decay of surplus biomass are not included in the application of the methodology to the particular baseline scenario identified and therefore these sources are not accounted for in project activity emissions.
Project Activity	On-site fossil fuel consumption due to the project activity	CO ₂	No	No fossil fuel combusted at the project site.
	Off-site transportation of biomass	CO ₂	No	All biomass will be utilized from the sugar mill situated next to the project site.
	Combustion of biomass for electricity and / or heat generation	CH ₄	No	If the baseline accounts for emissions from these sources then they must be accounted for in project activity emissions, we have not accounted for these in the baseline and therefore exclude them from the analysis of project activity sources.
	Biomass storage	CH ₄	No	Since biomass is not stored for more than one year, the emission sources are not accounted in for project activity emissions

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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The determination of the baseline scenario requires us to consider the most conservative baselines for the generation of power, the generation of heat and the use of biomass.

For power generation, the realistic and credible alternatives may include:

Alternatives as per ACM 0006	Description



P1	The proposed project activity not undertaken as a CDM	It is not a credible baseline scenario as without the registration of the CDM project it would not occur.
P2	The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-)fired in the project activity.	This may be ruled out as the power plant is not a continuation of power generation in an existing biomass residue fired power plant at the project site.
P3	The generation of power in an existing plant, on-site or nearby the project site, using only fossil fuels	It may be ruled out as setting up a similar sized fossil fuel power plant to supply to the grid is not feasible given the scale of the plant nor is it part of the core business of the company.
P4	The generation of power in the grid	This would also be a credible baseline – the generation of power in existing and/or new grid connected plants – as the power from the project activity will be fed into the grid and is thus expected to displace power from existing and planned capacity additions of the northern region grid.
P5	The installation of a new biomass residue fired power plant, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case.	This is a credible baseline as it would be possible for the plant to install a lower efficiency system using just bagasse as a fuel.
P6	The installation of a new biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity. Therefore, the power output is the same as in the project case	This may also be ruled out as the power generation in the project case is not same as in power generation in common practice in the relevant industry sector.
P7	The retrofitting of an existing biomass residue fired power, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore	This may be ruled out as the power plant is not a retrofit to an existing biomass residue fired power system.



	with a lower power output than in the project case.	
P8	The retrofitting of an existing biomass residue fired power that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity.	This may be ruled out as the power plant is not a retrofit to an existing biomass residue fired power system.
P9	The installation of a new fossil fuel fired captive power plant at the project site.	It may be ruled out as there is not setting up a fossil fuel power plant

For heat generation, realistic and credible alternative(s) may include:

	Alternatives as per ACM 0006	Description
H1	The proposed project activity not undertaken as a CDM project activity	This would be ruled out because without consideration of the CDM registration the project would not occur
H2	The proposed project activity (installation of a cogeneration power plant), fired with the same type of biomass but with a different efficiency of heat generation (e.g. and efficiency that is common practice in the relevant industry sector)	This is the most realistic interpretation as the common practice in the region is to use low efficient energy generating units as compared to that of the project activity.
H3	The generation of heat in an existing cogeneration plant, on-site or nearby the project site, using only fossil fuels	Not Applicable (NA) as the project activity generate steam to the adjoining sugar plant
H4	The generation of heat in boilers using the same type of biomass residues	This could also one of the alternatives.
H5	The continuation of heat generation in an existing power plant, fired with the same type of biomass as in the project activity, and implementation of the project activity, not undertaken as a CDM project activity, at the end of the lifetime of the existing plant	As the project is a Greenfield project this is not a credible alternative.
H6	The generation of heat in boilers using fossil fuels	NA as the project activity generates LP steam to the sugar plant.
H7	The use of heat from external sources, such as district heat	NA as the project activity generates LP steam to the sugar plant.
H8	Other heat generation technologies (e.g. heat pumps or solar energy)	NA as the project activity generates LP steam to the sugar plant.



For the use of biomass residues, the realistic and credible alternative(s) may include:

	Alternatives as per ACM 0006	Description
B1	The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.	As the bagasse is predominantly used for heat generation the scenario could be eliminated.
B2	The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled ² or left to decay on fields	As the bagasse is predominantly used for heat generation the scenario could be eliminated.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	As the bagasse is predominantly used for heat generation the scenario could be eliminated.
B4	The biomass is used for heat and/or electricity generation at the project site.	This would be the most realistic alternative that in the absence of the project activity the biomass would be used for heat/power generation but with lower efficiency.
B5	The biomass is used for power generation, including cogeneration, in other existing or new grid connected power plants	As the fuel is also used for captive heat and power purposes this could be eliminated.
B6	The biomass is used for heat generation in other existing or new boilers at other sites	As the fuel is also used for captive heat and power purposes this could be eliminated.
B7	The biomass is used for other energy purposes, such as the generation of bio fuels.	No such technology is available from the feedstock of the project activity exists in the host country.
B8	The biomass is used for non-energy purposes, e.g. as fertilizer or as feedstock in processes	Most of the generated biomass would be used for energy purposes only. Some portion of the biomass is used as feedstock by the local paper industry, but on account of surplus availability of bagasses, this is not considered to be a major issue.

From the above analysis the suitable baseline scenario relates to the project activity is scenario 4 – P4 & P5, H2 and B4. The baseline scenario is therefore the new power plant would be established to provide electricity and steam to the adjacent sugar factory. In absence of this proposed project, the biomass generated would be combusted in a less efficient manner to provide enough power for the operation of the sugar factory.

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 CDM project activity (assessment and demonstration of additionality): >>



As per the proposed baseline methodology, the project proponent is required to establish that the GHG reductions due to the project activity are additional to those that would have occurred in the absence of the present project activity as per the “Tool for the demonstration and assessment of additionality”, Version 04, EB36.

Additionality of the project as described in proposed tool provides for a step-wise approach to demonstrate and assess additionality. These steps include:

- Identification of alternatives to the project activity;
- Investment analysis to determine that the proposed project activity is not the most economically or financially attractive;
- Barriers analysis; and
- Common practice analysis.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations.

Sub-step 1a. Define alternatives to the project activity:

The following alternatives are consistent with the current laws and regulations of the host country: As per ACM 0006, the alternatives should be identified as per the baseline case

Option A:

P4 and P5: The proposed project activity (installation of a power plant), fired with the same type of biomass but with a lower efficiency of electrical generation (e.g. an efficiency that is common practice in the relevant industry sector) and the generation of power in the grid

In the absence of the project activity, power would have been generated for one part in the plant, but in a less effective manner than in the proposed project, using a low-pressure boiler, and for another part, by the power plants in the Northern regional electricity grid. This is compliant with legal and regulatory requirements and therefore suitable to be considered as the baseline for the project activity. The two identified alternatives are described separately

1. Generation of power with existing/new grid connected power plants.

Power generation is the single most significant activity that results in anthropogenic greenhouse gas emissions, especially carbon di-oxide. The main reason for this is the use of carbon intensive fossil fuels in power generation. These include sub bituminous coal, brown coal/lignite, HFO, diesel and natural gas. In India, like in many developing countries, coal is the mainstay of fuels used for power generation. The overall nationwide mix of thermal to hydroelectric power has deteriorated in the past five decades and stands currently at around 74:26¹. There are plans to augment this capacity, which mainly comprises thermal power using fuels like coal, natural gas and some hydropower projects. As a whole the Northern regional power grid exhibits a high composition of carbon intensive fuels with more than 74% of the generated power.

¹ Ministry of Power Annual Report 2003-04



As per the plan of the GoI, an additional 100,000 MW of capacity is expected by 2012, of which 30% is expected through hydropower. 33 % of these installations are expected to take place in the Uttaranchal region, which falls under the Northern region. As per the load generation scenario presented by POWER GRID by early 11th plan (2008-09), the Northern and the Western regions will have a deficit of 8000 MW each, whereas the Eastern and North-eastern regions will have a surplus of 10,500 MW and 3000 MW respectively. Considering that, to cater the need of the Northern region, the power has to be transported from the Eastern region, a solution that is fossil fuel intensive and that is not favoured by the policies. The surplus projected in the Northeastern region is still under construction. Under this scenario, the most conservative baseline would be that in the absence of the project activity, the power that is supposed to be exported from this unit would be generated elsewhere in the region and thus be based on fossil fuel.

In this context of growing energy needs, the generation of power through the proposed project seems to be a good option, as it does not generate greenhouse gases. The power generated and fed to the grid will help in replacing the many units that would otherwise have been supplied by carbon intensive fuel sources on the margin. In the absence of the proposed project, either these carbon intensive sources (most probably the thermal power supplied by the central power PSUs) would have been despatched or the power requirement would have been left unmet.

The proposed project activity is displacing grid electricity, which is fed by both fossil, and non-fossil fuel based generation sources. Keeping in mind the electricity scenario presented above, the entire Northern Region Electricity Grid (NREB) system with its expansion plans, generation and investment trends are taken into consideration when identifying the baseline scenario.

It was found that the grid system is highly carbon intensive due to the major share of power coming from coal, lignite and gas based thermal power plants. As per the latest records of power generation, the share of thermal power is around 74.4%, Hydro 21.32% and Nuclear 4.33%. Presently, the electricity supply position in the region is at a deficit by 11.93 % (peak) and energy shortage by 9.60%. Further, as per the 16th Electric Power Survey by Central Electricity Authority, the growth in the energy requirement is around 6.9% till 2017. About 27,000² MW shall be added in order to meet the present energy demand and the growth in the energy requirements, which means the mobilisation of huge financial resources into the power sector. The capacity addition planned at present will not be sufficient to meet the energy demand and it is most likely that all power generating plants will be in operation during the crediting period. An analysis of the past data indicates that the planned capacity could never be achieved in the power sector in the country. The last two five-year plans (the eighth and the ninth plan) have a deficit of 46 % and 53 % respectively, in regard of the targeted capacity addition.

In the absence of the proposed project, deficit power may be met from the fossil fuel based power plants.

Table B.2. Installed capacity mix and energy supply position in the Northern Region.

Installed Capacity (MW) as on 31.03.2005

State	Thermal				Nuclear	Total	Energy Deficit	Peak Deficit
	Hydro	Coal	Gas/Diesel	Total			MU/day	MW
Delhi	0	1087.5	612.4	1699.9	0	1699.9	0.43	68

² Estimation based on the present capacity, deficit and project growth in energy demand for the region.



Haryana	62.4	1525	430	2017.4		2017.4	4.2	310
Himachal Pradesh	4568.6	0	0	4568.6		4568.6	0.23	40
Jammu & Kashmir	1471.8	0	175	1646.8		1646.8	5.84	122
Punjab	2546	2120	0	4666		4666	6.38	1132
Rajasthan	430	2295	526.8	3251.8	740	3991.8	1.37	180
Uttar Pradesh	516.6	9629	1469	11614.6	440	12054.6	27.52	1677
Uttaranchal	1603.9	0	0	1603.9		1603.9	0.35	55
Chandigarh	0	0	2	2		2	0	0
source (Energy & Peak Deficit):			Northern Region Electricity Board Annual Report 2004-2005					
Source: www.cea.nic.in								

Installed Capacity (%)								
State	Thermal				Nuclear	Total	Energy Deficit	Peak Deficit
	Hydro	Coal	Gas/Dirsel	Total			%	%
Delhi	0.00	63.97	36.03	100.0	0.00	100	0.75	1.91
Haryana	3.09	75.59	21.31	100.0	0.00	100	7.00	7.89
Himachal Pradesh	100.00	0.00	0.00	100.0	0.00	100	2.33	5.76
Jammu & Kashmir	89.37	0.00	10.63	100.0	0.00	100	23.40	9.04
Punjab	54.56	45.44	0.00	100.0	0.00	100	7.12	16.88
Rajasthan	10.77	57.49	13.20	81.5	18.54	100	1.68	3.86
Uttar Pradesh	4.29	79.88	12.19	96.3	3.65	100	19.35	21.04
Uttaranchal	100.00	0.00	0.00	100.0	0.00	100	2.77	6.43
Chandigarh	0.00	0.00	100.00	100.0	0.00	100	0.00	0.00
source (Energy & Peak Deficit):			Northern Region Electricity Board Annual Report 2004-2005					
Source: www.cea.nic.in								

The Ministry of Non-conventional Energy Sources has targeted an increase of 10% of the total installed capacity in the year 2001, with 10,000 MW through renewable energy sources by the year 2012. The Northern region is expected to add about 2784³ MW approximately. But, it is unlikely to achieve this target due to a number of constraints prevailing in the Northern region with regard to the terrain and regulation. Substantial nuclear capacity addition is not possible during the crediting period. Only two nuclear projects are under construction in the Northern region with a total capacity of 440 MW⁴, which are expected to commission during 2007.

As it appears above, the dependence will continue to be on fossil fuel based power generation sources such as coal and natural gas. This will increase the grid system carbon intensity from the present level.

³ Total installed capacity in India in the year 2001 is about 100,000 MW. 10% of it is targeted for addition by the year 2012 through renewable energy sources. As per the Annual Report of 2001-2002 of the Ministry of Power, installed capacity in the Northern region is 27,843 MW in the year 2001 and 10% of the installed capacity amounts to 2,784 MW, which is expected to be added through renewable energy sources.

⁴ Nuclear Power Corporation of India Ltd.: Rajasthan Atomic Power Station in Rajasthan. Units 5 & 6 of capacity 2 x 220 MWe are expected to be commissioning during 2007.



To conclude, in the absence of the project activity, the power would be generated by the power plants in the Northern regional electricity grid (carbon intensive grid). This is in compliance with legal and regulatory requirements and therefore suitable to be considered as baseline for the project activity.

2. *The proposed project activity (installation of a power plant), fired with the same type of biomass but with a lower efficiency of electrical generation (e.g. an efficiency that is common practice in the relevant industry sector)*

In India, more or less all the sugar mills have their own cogeneration units, most of them operating with a medium-pressure boiler configuration (45 kg/cm²) to cater their in-house steam and power requirements. Conventionally it is easier for sugar mills to opt for low efficiency cogeneration plants considering that they are less capital intensive. Cogeneration plants with outlet boiler pressure of 45-kg/cm² produce lesser power (as compared to MCM's 87 kg/cm²) and are less capital intensive. MCM had an option to install medium pressure boilers as against selected configuration of 87kg/cm²-outlet boiler pressure however they have implemented "modern and energy efficient technology", which was available in the country at the time the decision was taken for the implementation of the project activity.

By the time the project was conceived, the project activity was one of the first few in India and only the fourth in the state of Uttar Pradesh to implement the bagasse cogeneration with this pressure and temperature configuration. Hence it is clearly a unique project and not a business as usual scenario (BAU) as only four cogeneration plants with equivalent pressure and temperature configuration were implemented before the project i.e. Aug 2006.

The total installed capacity in Uttar Pradesh as on 31st March 2005 (just prior to the project activity) was 73 MW from the biomass and cogeneration projects. The total power generation potential in the country is based on the bagasse as feed is estimated to be 5000 MW⁵. The estimated quantity in Uttar Pradesh is in excess of 1300 MW.

Power export to UPPCL grid by the project activity will replace the conventional power (contributed by a generation mix predominated by fossil fuel based power plants) by cleaner power and therefore enable GHG emission reductions.

From the above it is evident that, prior to the project activity, there was negligible contribution of energy through renewable energy sources in Uttar Pradesh. MCM's project activity, resulting in the export of green power to the UPPCL grid from 2006, is a unique and pioneering contribution to the state of Uttar Pradesh and India around the time of its implementation.

It is very likely that MCM would have opted to generate power necessary for the captive purposes by operating the lower efficiency boiler in the absence of the CDM project activity.

B4: The biomass (bagasse) is used to generate heat and power at the project site

In the absence of the proposed project activity (project plant) the plant would have generated the heat and power in the plant referred to as reference plant but with low electric efficiency. The proposed project does not increase the thermal firing capacity and the raw material input.

⁵ http://www.mnes.nic.in/annualreport/2005_2006_English/CH2/3.htm



1. More than 96% of the bagasse would be used to generate steam and power in the low-pressure boiler and turbine system required for auxiliary, sugar plant and colony consumption
2. A very small portion (about 4 %) of excess bagasse would be stored in open silos at the project site where it would remain until it is used for start-up during the season and,
3. So far the unit has not diversified any bagasse outside the industrial facilities other than its own LP based power generation units.

Had the project activity not been implemented, biomass would have been mostly used for power generation in in-efficient manner. No bagasse would have been left to decay naturally or burn in an uncontrolled manner.

H2 - The proposed project activity (installation of a cogeneration power plant), fired with the same type of biomass but with a different efficiency of heat generation (e.g. an efficiency that is common practice in the relevant industry sector)

The generation of heat at MCM would have been generated in the lower pressure boilers using the same type of biomass (i.e. bagasse) in the absence of the project activity. Option H2 is the most likely baseline option. However, in the case of cogeneration plants, the consequences of the displacement of heat on GHG emissions need to be determined. Out of the 121 sugar mill units sanctioned⁶ /operating in the state of Uttar Pradesh, only four units other than MCM have such high configuration that the emissions are not increased. All four units have been developed under the CDM. It is then possible to admit that there would be no emission increases from the project activity.

The project would have utilized mill generated bagasse during season as a fuel for the heat and electricity generation for on-site use only (i.e. by setting up a 45 ata boiler and generator set) and not exporting any power to the grid. This would have resulted in 'excess' power (power during off-season) would be generated by / in the Northern Indian grid.

Option B:

The proposed project activity is not undertaken as a CDM project activity

The promoters have gone on record with their reluctance to set up the bagasse cogeneration unit with such a high pressure boiler based power unit, primarily on account of the high capital cost and the inherent technical and operational risks involved. In fact, it was only when the CDM related revenue was highlighted that the investors agreed to invest the equity component required to fund the high-pressure configuration. Otherwise, the investors were of the opinion that the project was very risky and preferred to set up the project by installing a low-pressure boiler to cater the internal thermal and electrical energy needs of the plant as prevailing in the sector.

In addition, all (most) similar projects being set-up in the country (in the sugar segment) are being developed under the CDM. In view of the above, it may be concluded that at the point in time when the decision to proceed with the project was taken, the related CDM revenue was seriously considered and

⁶ Letter from Uttar Pradesh Sugar Mills Association and UP Power Transmission Corporation Ltd. be evidence for.



was a key factor in making the favorable decision (suitable documents will be provided to the DOE at the time of validation)

Thus the option to undertake this project as a non-CDM project was/is not a viable baseline scenario

Sub-step 1b. Enforcement of applicable laws and regulations:

Considering the business as usual practice in the sugar mill industry and the level of feasibility and conservativeness, the alternative project that must be chosen as the baseline scenario is the alternative that most likely and conservatively reflects how the electric power would have been generated if the proposed project activity had not been implemented.

This sugar mill would have complied with all outstanding legal and environmental regulations in India, as the alternative most sophisticated sugar mill currently does.

Step 2: Investment analysis OR

Step 3: Barrier analysis

MCM proceeds to establish project additionality by conducting the step 3. Barrier Analysis

Sub-step 3a: Identify barriers that would prevent a wide spread implementation of the proposed project activity:

(A) Investment barriers:

The factory has not historically been a grid generator and further operational barriers facing the project relate to the supply of power to the grid. The project participants would have to assemble all the technical and managerial means necessary to a successful operation of the plant. The sale of power to UPPCL presents a risk to the project. There is currently uncertainty surrounding the received price in the power purchase agreement. Whilst there is an MNES advised tariff this is not applied in Uttar Pradesh, the current price for electricity from bagasse cogenerations in UP is Rs 2.86/kWh. Along with the risk of final price for electricity there is also the risk of late payment by the UPPCL. These two factors provide significant risk that the project will face and the revenue from CERs would help reduce these risks.

Under the terms and condition of the power purchase agreement (PPA) granted to the project activity there remains an uncertainty in the tariff, the tariff may be reviewed post 2009 as there is no specified rate beyond the 2009-10 season. This provides considerable uncertainty to the project developer as to future rates in force. The actual tariff in the first year for the project activity will be Rs 2.86/kWh which is far below the earlier Ministry of Non-Conventional Energy Sources (MNES). The MNES advised a tariff of Rs 2.25 in 1994-95 escalated at a rate of 5%, which currently equates to a tariff of Rs 3.60/kWh.

The total project cost involved is 98.05 Crores. The banking and other funding institutions took on 50% of the project's total cost. It is costly to implement high-pressure configuration cogeneration projects as compared to conventional low pressure or medium- pressure cogeneration plants and that's the reason why most of the sugar plants in the state as well as in the country use low to medium pressure configurations.



MCM faced investment barriers and in particular a high upfront cost it was difficult to interest financial institutions and banks and to obtain financial closure for the project. As MCM had only been into the sugar production business with very little background in power sector economics, getting financial support from banks was a difficult proposition and having the investors provide bigger equity on proposing a HP steam-generating system is a daunting task.

In view of the above, the offer by Vitol S.A. to purchase the CERs at a price in the range of US\$ 8-11, together with its offer to organize for upfront funding in exchange for suitable collateral, should the company so desire played a very critical role in the decision making process for this project.

(B) Technological barriers:

The project activity has adopted a high-pressure co-generation technology, which was relatively new in Uttar Pradesh at the time the project activity was developed. The project activity uses a technology that still had a small market share and low penetration at the time the project was developed. The low penetration of this technology is due to the efficiency of existing equipments, to the availability of skilled manpower to operate the plant continuously *etc.* MCM was one of the first few companies in Uttar Pradesh to overcome the technology barrier by adopting 87kg/cm² pressure and STG of double extraction cum condensing type. The technological barrier becomes even more significant considering the untapped renewable energy potential in UP using bagasse as fuel. The total potential for power generation from the bagasse in UP is 1350 MW of which only 5% is being installed.

Furthermore, the cogeneration unit would be an integral part of Sugar Mill unit. With the implementation of the project, all standby units would have to forego, a valiant techno-economic decision, which requires streamline meticulous preventive checks. A one-time failure of the boiler and its auxiliaries would lead to a production downturn in the mill. This would lead to huge financial losses and could adversely affect both fuel efficiency and PLF.

The following verse from the WADE report clearly states that the additional benefits are required for the sugar industry to adopt high-energy technology solutions.

According to the world alliance for the decentralized energy, WADE (2004), as, until recently, the sale of surpluses was not a common practice in the sector, the industry developed units of low efficiency exclusively to guarantee self-sufficiency of energy and steam and to deal with the problem of the bagasse accumulation and elimination. Moreover, starting at the time the sugar mills' cogeneration facilities are replaced, or when a new cogeneration unit is created, the equipments have a lifetime of more than 20 years. The decision to purchase low efficiency equipments means that the plant will not take advantage of its potential surpluses of electricity. The choice of the equipments is decisive in order for the plant to make its electricity surplus potentially available. The incentives for more efficient technologies are an important factor in that aspect. Still, even in the case of new facilities, the interest rates don't always make it possible to adopt more efficient technological options.

(C) Other Barriers:

Managerial resource and organizational barrier: MCM had to overcome the managerial resource barrier because of the lack of trained manpower to operate the cogeneration plant. Considering that the plant is situated in a rural area and that MCM has long been involved in the business of sugar production



and rural economics, it had to develop skills in dealing with the economics of electricity generation and distribution and in dealing with power sector economics and related.

Institutional Barrier: MCM's cash flows from the selling of power are entirely dependent on the economic situation of the state electricity boards (UPPCL). The MCM project activity has signed a power purchase agreement (PPA) with UPPCL against the sale of electricity to the grid. It is acknowledged that the condition of electricity boards in India is not very healthy and it is likely that, there would be problems with MCM's cash flows. MCM had to take this risk and face this institutional barrier on which they have limited or no control and therefore CDM funds are critical to MCM.

It is also to be noted that as per the electricity act 2003 the share of renewable should be 10% of the total installed capacity, where as Uttar Pradesh has reduced to 7.5 % which may lead for the project activity to reduce its generation PLF as it happened in nearby states. Under that condition the project could only survive with the additional CDM benefits.

UPPCL has also undergone an experience as one of the high technical and commercial loss making Power Corporation in the country.

Grid Synchronization: As per the wheeling agreement with UPPCL, this one cannot be held responsible for any damage, whatsoever, that may be caused to the generating sets or any other equipment installed in CPP on account of parallel operation with the Northern regional grid, and UPPCL shall not be responsible to pay any compensation for any such damages. The protection system will have to be provided at the company's expense to ensure no damages are done due to the paralleling of the CPP. Relays at the board's substation will be tested at intervals of six months and results will be furnished to the company. The repair/ replacement/ maintenance of such protection equipments shall be at the company's expense. It is also to be kept in mind that more than two times the northern region grid failed due to imbalance.

Sub-step (3b). Show that the identified barriers would not prevent a wide spread implementation of at least one of the alternatives (except the project activity already considered in step 3a):

Since the barriers mentioned above are directly related to venturing into the business of export of power to a grid (sale of electricity) there are no impediments for sugar manufacturing plants and also MCM to implement any of these alternatives.

Barriers discussed above are strong enough to hinder the sector's growth as it appears in the data on the 'Common Practice Analysis' of bagasse-based cogeneration (discussed below) and therefore the project activity is additional, as it has overcome the above barriers by taking up the risk of implementing this power project.

Furthermore, these barriers do not exist for the alternatives/ options discussed above and thus do not prevent the widespread implementation of these alternatives.

Step 4: Common Practice Analysis

Sub-step 4a: Analyse other activities similar to the proposed project activity:



Historically, the sector has always exploited its biomass in an inefficient manner by using low-pressure boilers. Although they consume almost all the biomass for energy generation, this energy is used for in-house consumption purposes and it is done in such a manner that no surplus electricity is available for sale, and very few (if any) companies have ventured in the electricity market, till very recently.

From Steps 1, 2 and 3 it can be concluded that the option/ alternative (combination of power generation, steam generation and biomass use), does not have hurdles or barriers, which prevent their implementation. However, the project activity faces managerial, institutional and investment barriers, which could prevent MCM from implementing it as already elaborated in the ‘Barrier Analysis’.

The common practice scenario as tabulated below in Table 2.1 substantiates that the project activity without CDM benefits is not a preferred proposition for the sugar-manufacturing units placed in the Uttar Pradesh State socio-economic environment. The low efficiency and turbine configuration (which meets the plant’s energy requirements with no surplus power generation) is the most common practice adopted by the sugar- manufacturing units across the country. The Indian sugar manufacturers have been utilizing their bagasse in an inefficient manner by using low-pressure boilers (with low electrical and thermal energy efficiency) to generate steam and electricity only for in-house consumption.

For a similar project sector, socio-economic environment, geographic conditions and technological circumstances, the project activity uses an efficient technology, which is not a common practice.

Table 2.1: Common Practice Analysis for MCM project activity

Total number of Sugar Mills in Uttar Pradesh (as on Dec 2004)	120
Co-generation unit to meet plant energy requirement with no surplus power	93
Co-generation unit to meet plant energy requirement with some surplus power	7
Co-generation unit to meet plant energy requirement with some surplus power generation, all with CDM revenue / being developed under the CDM.	4
Closed Sugar mills	17
Reference: Indian Sugar Mill Association (ISMA)	

Before the project activity was implemented there were only four sugar mills in the state of Uttar Pradesh (UP) out of 121 sugar mills, operating with a grid connected cogeneration unit of high-pressure configuration of 87 kg/cm² (an equivalent configuration as of the proposed project) and above. This shows a very low penetration of technology (3.3 % in UP) and justifies that the project activity is additional.

The majority of projects implemented / under implementation are targeting registration under the Clean Development Mechanism in order to generate additional revenues that are so essential to make the projects viable and thus possible.

Sub-step 4b: Discuss any similar options that are occurring

Most of the similar projects have been implemented recently and most, if not all, of them are being developed under the Clean Development Mechanism.

**Impact of CDM registration**

The registration of this CDM project activity will contribute in overcoming all the barriers described in this tool: technological, investment, and other barriers will all be significantly mitigated on the account of the additional revenue generation from the sale of carbon credits. This would bring more solidity to the investment itself, thus fostering and supporting the project owner's decision to break through on their business model. The project activity is already engaged in negotiations to sell their expected CERs.

In addition, the CDM project registration would influence other similar projects to be set up and encourage the use of CERs as an additional revenue stream that is reliable enough to be seriously considered in the project's returns computation.

It is ascertained that the project activity would not have occurred in the absence of the CDM simply because no sufficient financial, policy, or other incentives exist locally to foster its development in India. Without the proposed carbon financing for the project, the MCM would not have taken the investment risks in order to implement the project activity. Further CDM funds will provide additional coverage to the risk attached to the failure of the project activity, the shutting down of the plant and the loss of production. In such an event the BAU baseline option is continued with release of carbon dioxide emissions.

Furthermore, with the CDM project activity registration, many more sugar manufacturing industries in India would take up similar initiatives under the CDM, overcoming the barriers to project activity implementations, and resulting in higher quantum of anthropogenic greenhouse gas emissions reductions.

B.6. Emission reductions:**B.6.1. Explanation of methodological choices:**

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The project activity mainly reduces CO₂ emissions through the substitution of power and heat generation with fossil fuels by energy generation with biomass. The emission reductions ER_y linked to the project activity during a given year y is given by:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

Where

$ER_{heat,y}$ are the emission reductions due to displacement of heat during the year y in tons of CO₂,
 $ER_{electricity,y}$ are the emission reductions through substitution of electricity generation with fossil fuels
 $BE_{biomass,y}$ are the baseline emissions due to natural decay or burning of anthropogenic sources of biomass during the year y in tons of CO₂ equivalents,
 PE_y are the project emissions
 L_y are emissions due to leakage

Emission reductions due to displacement of heat ($ER_{heat,y}$)



MCM has not claimed for emission reductions due to heat generation in the project activity but is required to demonstrate that emissions do not arise from combustion of more bagasse.

The thermal efficiency in the project plant is larger than the thermal efficiency of the reference plant. In the project activity additional biomass is being fired to generate higher quantum of heat generation for both process steam and for power generation. Since the increased level of heat generation in the MCM project activity is attributed to additional bagasse being fired in the project activity and therefore the additional heat generation can be assumed not to involve additional emissions and therefore $ER_{heat,y} = 0$.

Emission reductions due to displacement of electricity ($ER_{electricity,y}$)

Emission reductions due to the displacement of electricity are relevant for all scenarios as per ACM 0006 and are calculated by multiplying the net quantity of increased electricity generated with biomass as a result of the project activity (EG_y) with the CO₂ baseline emission factor for the electricity displaced due to the project ($EF_{electricity,y}$), as follows:

$$ER_{electricity,y} = EG_y * EF_{electricity,y}$$

Where:

$ER_{electricity,y}$ are the emission reductions due to displacement of electricity during the year y in tons of CO₂,

EG_y is the net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y in MWh,

$EF_{electricity,y}$ is the CO₂ emission factor for the electricity displaced due to the project activity during the year y in tons CO₂/MWh.

Since the power generation capacity of the biomass cogeneration plant is more than 15MW, $EF_{grid,y}$ (since $EF_{electricity,y} = EF_{grid,y}$) is calculated as a combined margin (CM), following the guidance in the section “baselines” in the “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (ACM 0002)

$$EG_y = EG_{project\ plant,y} - \varepsilon_{el,other\ plant} * 1/3.6 * \sum BF_{k,y} * NCV_k$$

Where:

$EG_{project\ plant,y}$ is the net quantity of electricity generated in the project plant during the year y in MWh,
 $\varepsilon_{el,other\ plant}$ Average net energy efficiency of electricity generation in (the) other power plant(s) that would use the biomass residues fired in the project plant in the absence of the project activity (MWhel/MWhbiomass)

$BF_{k,y}$ is the quantity of biomass type i used as fuel in the project plant during the year y in a volume or mass unit, and

NCV_k is the net calorific value of the biomass type i in terajoules (TJ) per mass or volume of biomass

Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass



In the case of scenario 4, in the absence of the project activity, the biomass would still be used to generate power and would not be left to natural decay or uncontrolled burning.

Baseline emissions due to the natural decay or uncontrolled burning of anthropogenic sources of biomass are assumed to be zero $BE_{biomass,y} = 0$.

Project Emissions (PE_y)

Project emissions include CO₂ emissions from the transportation of biomass to the project site (PET_y) and CO₂ emissions from the on-site consumption of fossil fuels due to the project activity ($PEFF_y$) and, where this emission source is included in the project boundary and relevant, CH₄ emissions from the combustion of biomass ($PE_{Biomass, CH_4, y}$):

$$PE_y = PET_y + PEFF_{CO_2, y} + GWP_{CH_4} * PE_{Biomass, CH_4, y}$$

Where:

PET_y are the CO₂ emissions during the year y due to transport of the biomass to the project plant in tons of CO₂,

$PEFF_{CO_2, y}$ are the CO₂ emissions during the year y due to fossil fuels co-fired by the generation facility in tons of CO₂,

GWP_{CH_4} is the Global Warming Potential for methane valid for the relevant commitment period,

$PE_{Biomass, CH_4, y}$ are the CH₄ emissions from the combustion of biomass during the year y .

Project emissions from Biomass transportation to the power plant (PET_y)

The fossil fuel combustion for transportation of bagasse from mill to the project plant is considered:

$$PET_y = N_y * AVD_y * EF_{km, CO_2, y}$$

Where:

PET_y = CO₂ emissions during the year y due to transport of the biomass residues to the project plant (tCO₂/yr)

N_y = Number of truck trips during the year y

AVD_y = Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year y (km)

$EF_{km, CO_2, y}$ = Average CO₂ emission factor for the trucks measured during the year y (tCO₂/km)

Project emissions from combustion of fossil fuel in the power plant ($PEFF_{CO_2, y}$)

There is no fossil fuel combustion associated with the project activity. Hence there is no project emissions associated to fossil fuel combustion due to the MCM project activity implementation ($PEFF_{CO_2, y} = 0$). Therefore project emissions due to the fossil fuel combustion have not been considered.

CH₄ emissions from the combustion of biomass residues ($PE_{Biomass, CH_4, y}$)

The project emissions from the combustion of biomass residues are calculated as mentioned in the methodology:

$$PE_{Biomass, CH_4, y} = EF_{CH_4, BF} * \sum BF_{k, y} * NCV_k$$

Where:



$BF_{k,y}$ = Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter or liter)

NCV_k = Net calorific value of the biomass residue type k (GJ/ton of dry matter or GJ/liter)

$EF_{CH_4,BF}$ = CH₄ emission factor for the combustion of biomass residues in the project plant (tCH₄/GJ)

Leakage (L_y)

The main potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion due to diversion of biomass from other users to the project as a result of the project activity. With the baseline scenario wherein the use of biomass for energy generation is considered, the diversion of biomass to the project activity is already considered in the calculation of baseline reductions. Hence, no leakages are considered for the project activity.

Since the MCM sugar plant is a Greenfield power project, the bagasse generated at the sugar plant was not available for use to the other users. Therefore there is no diversion of biomass resulting to an increase in emissions from fossil fuel combustion at other sources with respect to the quantity of bagasse generated in MCM sugar plant.

Emission Reductions

The total emission reductions due to the project activity are presented in the following sections.

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

(Copy this table for each data and parameter)

Data / Parameter:	EF_y
Data unit:	tCO ₂ /GWh
Description:	CO ₂ emission factor of the grid
Source of data used:	Central Electricity Authority Baseline database
Value applied:	787.118
Justification of the choice of data or description of measurement methods and procedures actually applied :	The baseline emission factor has been considered from the “ CO₂ Baseline Database ” published by CEA Version 03 on 15 th December 2007. The emission factor published by CEA for the latest 3years based on combined margin approach.
Any comment:	This data item is required for estimating the baseline emissions and emission reductions.

Data / Parameter:	EF_{km,CO₂,y}
Data unit:	tCO ₂ /km
Description:	Average CO ₂ emission factor for the trucks measured
Source of data used:	Values are based on the 2006 IPCC Guidelines
Value applied:	0.00078056
Justification of the choice of data or description of	The average CO ₂ emission factor for the trucks used for transporting the biomass residue has been considered from the “ IPCC guidelines 2006 ”. The equivalent emission factor for CO ₂ , CH ₄ and N ₂ O are considered.



measurement methods and procedures actually applied :	
Any comment:	This data item is required for estimating the baseline emissions and emission reductions.

Data / Parameter:	EF _{CH₄,BF}
Data unit:	tCH ₄ /TJ
Description:	CH ₄ emission factor for the combustion of biomass residues in the project plant
Source of data used:	Values are based on the ACM0006 Table 3 and 2006 IPCC Guidelines, Volume 2, Chapter 2, Tables 2.2 to 2.6.
Value applied:	0.0411
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default CH ₄ emission factor of 30 kg/TJ from Table 3 is used; the uncertainty is estimated to be 300%, resulting in a conservativeness factor of 1.37. Thus, in this case a CH ₄ emission factor of 0.0411 tCH ₄ /TJ is used.
Any comment:	This data item is required for estimating the baseline emissions and emission reductions.

B.6.3 Ex-ante calculation of emission reductions:

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The project activity mainly reduces CO₂ emissions through the substitution of power and heat generation with fossil fuels by energy generation with biomass. The emission reductions ER_y linked to the project activity during a given year y is given by:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

Where

$ER_{heat,y}$ are the emission reductions due to displacement of heat during the year y in tons of CO₂,
 $ER_{electricity,y}$ are the emission reductions through substitution of electricity generation with fossil fuels
 $BE_{biomass,y}$ are the baseline emissions due to natural decay or burning of anthropogenic sources of biomass during the year y in tons of CO₂ equivalents,
 PE_y are the project emissions
 L_y are emissions due to leakage

Emission reductions due to displacement of heat ($ER_{heat,y}$): $ER_{heat,y} = 0$.

Emission reductions due to displacement of electricity ($ER_{electricity,y}$)

$$ER_{electricity,y} = EG_y * EF_{electricity,y}$$

$$EG_y = 119.61 \text{ GWh}$$

$$EF_{electricity,y} = 787.118 \text{ tCO}_2/\text{GWh} \text{ (CEA baseline database Version 03 dated 15}^{th}\text{ December 2007)}$$



The plant operates around 165 days during the crushing season with the balance of about 68 days off-season days. The cogeneration plant will operate during the off-season with the saved bagasse during the seasonal operation of the MCM sugar plant.

Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass: $BE_{biomass,y} = 0$.

Project Emissions (PE_y): PE_y = 4, 487 tCO₂e/yr (Refer to section B.6.1)

Leakage (L_y) L_y = 0 (Refer to section B.6.1)

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

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The emission reduction ER_y by the project activity during a given year y is given by:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

<i>Year</i>	<i>ER_{heat,y}</i> (tCO ₂ e/yr)	<i>ER_{electricity,y}</i> (tCO ₂ e/yr)	<i>BE_{biomass,y}</i> (tCO ₂ e/yr)	<i>Project activity emissions</i> (tCO ₂ e/yr)	<i>Leakage</i> tCO ₂ /yr	<i>Emissions Reductions from the project activity</i> tCO ₂ /yr
2008	0	94,150	0	4, 487	0	89,663
2009	0	94,150	0	4, 487	0	89,663
2010	0	94,150	0	4, 487	0	89,663
2011	0	94,150	0	4, 487	0	89,663
2012	0	94,150	0	4, 487	0	89,663
2013	0	94,150	0	4, 487	0	89,663
2014	0	94,150	0	4, 487	0	89,663

In the above table, the year 2008 corresponds to the period starting from 01.04.2008 to 31.03.2009. Similar interpretation shall apply for remaining years. The crediting period will start from the date of registration of the project with CDM EB.

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	BF_y
Data unit:	Tons
Description:	Quantity of bagasse combusted in the project plant during the year y
Source of data to be used:	Onsite measurement
Value of data applied for the purpose of calculating expected	405,748



emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Use of weight meters. The quantity should be cross checked with the quantity of production and fuel purchase receipts if any. The data will be recorded in paper and will be archived for crediting + 2 years.
QA/QC procedures to be applied:	Cross check the measurements with an annual energy balance that is based on the purchased quantities and stock changes. Manager Incharge would be responsible for calibration of the meters as per national standards.
Any comment:	-

Data / Parameter:	NCVi
Data unit:	Kcal/kg
Description:	Net calorific value of bagasse in the project plant in year
Source of data to be used:	Plant test reports
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2,272
Description of measurement methods and procedures to be applied:	Measurements were carried out at inhouse laboratory and according to relevant international standards The net calorific value testing of the total bagasse generated at the sugar plant will be conducted inhouse. The data will be recorded in paper and will be archived for crediting + 2 years.
QA/QC procedures to be applied:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (eg values in the literature, values used in the national GHG inventory) and default values by the IPCC
Any comment:	-

Data / Parameter:	EG project plant
Data unit:	MWh
Description:	Total quantity of electricity generated in the project plant in the year y
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	106,635
Description of measurement methods and procedures to be applied:	The project activity will have a DCS system to measure the data accurately. The digital meters are used to ensure high accuracy level and through the electricity bill by the distribution company.
QA/QC procedures to be applied:	Yes. The consistency of metered net electricity generation should be cross checked with receipts from sales. Manager Incharge would be responsible for



	calibration of the readings.
Any comment:	-

Data / Parameter:	EGaux
Data unit:	MWh
Description:	Electricity for auxiliary consumption in the project plant in the year y
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	14,541
Description of measurement methods and procedures to be applied:	The project activity will have a DCS system to measure the data accurately. The digital meters are used to ensure high accuracy level.
QA/QC procedures to be applied:	Yes. Direct measurement of the data at the plant site will be cross verified against the plant records. Manager Incharge would be responsible for calibration of the readings.
Any comment:	-

Data / Parameter:	EGy
Data unit:	MWh
Description:	Net quantity of electricity generated in the project plant in the year y
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	119,613.8
Description of measurement methods and procedures to be applied:	The project activity will have a DCS system to measure the data accurately. The digital meters are used to ensure high accuracy level and through the electricity bill by the distribution company.
QA/QC procedures to be applied:	Yes. The consistency of metered net electricity generation should be cross checked with receipts from sales. Manager Incharge would be responsible for calibration of the readings.
Any comment:	

B.7.2 Description of the monitoring plan:

>>

The methodology requires the project-monitoring plan to consist of metering the electricity generated by the project activity, total electricity generated by the unit at site, quantity of bagasse fired in project activity, calorific value of bagasse and net quantity of heat generated by project plant.



Energy meters would be used for monitoring the energy generated. The energy meters shall be maintained in accordance with electricity standards in India. Each meter would be inspected and sealed and shall not be interfered with by anyone.

Total quantity of bagasse fired in the project plant would be measured on the weighbridge. The weighbridge would be tested for accuracy every year. If during yearly test check, Weigh Bridge is found to be beyond permissible limits of error it would be calibrated immediately

The management of the plant designated one person to be responsible for the collation of data required to conduct the monitoring plan who will report to the General Manager (GM) of the plant. The overall responsibility for the timely reporting will remain with the GM. The electricity generation by all turbines and consumption by the auxiliaries will be recorded in the shift log-book by the shift in-charge on an hourly basis. These readings will be summarized at the end of day by the section head to prepare the daily report. Correspondingly, readings will be taken from UPPCL meter for the amount of electricity exported and monthly bills will be raised for the electricity exported as per UPPCL procedures.

The management of the plant will put in place monthly reporting of electricity and steam generation. This data will be part of the management information systems for the power plant and will also be used to calculate the emission reductions generated. This backup of this data will be kept both as a soft hand hard copy. The electrical meters will be calibrated once in a year by the agency approved by UPPCL.

The MCM project activity has employed the monitoring and control equipment that measure, record, report, monitor and control various key parameters. These monitoring and controls are a part of the DCS of the entire plant. All monitoring and control functions have been as per the internally accepted standards and norms of MCM, which were based on national and internationally industry standards.

Plant operation and training procedures that put in place will ensure the integrity of the data collected. Skilled manpower will be operating the proposed high-pressure configuration cogeneration power plant. Considering that the plant is situated in a rural area and that MCM has long been involved in the business of sugar production and rural economics, it had to develop skills in dealing with the economics of electricity generation and distribution and in dealing with power sector economics and related. MCM in addition to recruiting senior professionals with relevant experience in the power sector. MCM will have an Erection & Performance Contractor (EPC) contract for implementing / commissioning proposed cogeneration plant, as well as O & M contract for operation, to an experienced company.

Project Parameters affecting Emission Reduction

Monitoring Approach

The general monitoring principles are based on:

- Frequency
- Reliability
- Registration and reporting
- Bagasse Requirement and Utilization



As the number of units exported to the grid determines the emission reductions from the project, it becomes important for the project to monitor the net export to the grid on real time basis.

Frequency of monitoring

The project developer has installed all metering and check metering facilities within the plant premises as well as in the grid substation where exported power is connected to the grid. The measurement will be recorded and monitored on a daily basis by both UPPCL and the project developer.

Reliability

The amount of emission reduction units is proportional to the net energy generation from the project. Thus the final KWh meter reading is the final value from project side. All measurement devices are of microprocessor based with best accuracy procured from reputed manufacturers. Since the reliability of the monitoring system is governed by the accuracy of the measurement system and the quality of the equipment to produce the result all power measuring instruments is calibrated once a year for ensuring reliability of the system. All instruments carry tag plates, which indicate the date of calibration and the date of next calibration. Therefore the system ensures the final generation is highly reliable.

Registration and reporting

Registration of data is on-line in the control cabin through a microprocessor. However, hourly data logging will be there in addition to software memory. Daily and monthly reports are prepared stating the generation. In addition to the records maintained by the MCM, UPPCL also monitors the power exported to the grid and certify the same.

The other major factors, which need to be ensured and monitored, are: the use of bagasse fuel for power generation, power for the sugar plant, power for auxiliary purpose and the parameters that would ensure smooth and regular operation of the cogeneration. No other project specific indicators are identified that affect the emission reductions claims.

Bagasse Requirement and Utilization

Availability of Bagasse: The major fuel used by the cogeneration power plant is bagasse, generated by the sugar mill of MCM. The bagasse after sugar processing will be supplied to cogeneration plant. Hence, production of electricity is mainly depending on the bagasse received from this sugar mill. The receipt of bagasse to cogeneration plant mainly depends on the total cane crushed by the sugar mill

Quantity of the Bagasse fuel used in the boiler: The total amount of bagasse received from sugar unit will be based on the total sugar cane crushing and bagasse generated. The fuel entered into the plant premises will be first dumped in the fuel storage area from where it will be taken to the fuel processing machinery with the help of belt conveyors. The fuel processing machinery will cut the bagasse fuel into the required size and the processed bagasse fuel will be taken to boiler bunkers with the help of belt conveyors from where the fuel finally enters the boiler.

The belt conveyors which feed the bagasse fuel from processing machinery to boiler bunkers, consists of a metal detector, tramp iron detector, magnetic separator and online weighing system. Metal detector, tramp iron separator etc. will prevent any metal particles entering into the boiler and ensure that only fuel is conveyed to the boiler. An online weighing system provided to the belt conveyors measures, records and transmits the actual quantity of the fuel entering into the boiler for online monitoring in the DCS.



The weighing system will be calibrated regularly to ensure the accuracy of the measurement. The data will be recorded for further verification.

Since it is mandatory for sugar industries to submit yearly performance record, which also includes above parameters, to the government, these figures are to be crosschecked from this record. In case of any fossil fuel would be purchased this will also become evident from the audit report.

The main type of fuel proposed for the power generation is only bagasse. The properties of the bagasse fuels like ultimate analysis, calorific value, ash composition etc. are already established and will be consistent in the region. However, it is proposed to monitor various properties of bagasse fuels by taking samples at random from the fuel lots from the processed fuel so that in case of any drastic change in the properties, corrective actions can be taken. The measurement of fuel properties like ultimate analysis, calorific value etc. will be frequently checked in the lab test reports.

Procedure for emergency preparedness:

In accordance to the Industrial standards and requisite arrangements to deal with fire, electrical accident, mechanical accidents etc. are made in the project. Personal safety appliances are provided to the workers according to the requirement. Safety training and safety drill is provided from time to time by the personnel department.

Procedure for calibration and maintenance of monitoring equipment:

All the monitoring equipments shall be calibrated as per the recommendation of the manufacturer at scheduled intervals from accredited laboratory Manager will be responsible for getting the instruments checked and calibrated as per calibration schedule

Handling of Day-to-Day record: General Manager: Responsible for summarizing data of Electrical, Mechanical Departments and authorize on a daily and monthly basis.

Procedure for internal Audit.

A team consisting of experienced personnel will be constituted for the Internal CDM Audit, who will conduct yearly Audit. Wherever required the assistance from the CDM PDD consultants will be sought.

Monitoring, Reporting and Reviewing the GHG Parameters

The project activity has DCS data registration process through the control cabin. Daily, monthly and yearly reports will be prepared stating the gross electricity generation and in-house electricity consumption by MCM based on the data monitored by the Shift in charge and Manager. Daily report on auxiliary consumption will also be prepared by the MCM power department.

The monthly report prepared will be presented by General Manager and the review meeting conducted every three months. Discrepancies, if identified in the in-house operational system, will be addressed immediately.

The monitoring system, as discussed above, ensures proper quantification of the GHG emission reductions. At the same time, the monitoring system brings about the flaws in the system if any are identified and opens up the opportunities for improvement.



The General Manager of the plant is responsible for implementation of the Monitoring Plan and will have the authority to revise the monitoring plan in line with the methodology under infrastructural changes in the project activity and other associated operational systems.

Checking data for its correctness and completeness:

The CDM team is overall responsible for checking data for its completeness and correctness. The data collected from daily logs is forwarded to the central lab after verification from respective departments.

Reliability of data collected- The reliability of the meters is checked by testing the meters on yearly basis. Documents pertaining to testing of meters are maintained.

Frequency- The frequency for data monitoring shall be as per the monitoring details in Section D of this document.

Archiving of data- Data shall be kept for two years after the crediting period.

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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Date of completion and application of baseline and monitoring methodology: 04/01/2008

Name of responsible person/entity: Mankapur Chini Mills and their consultant

Detailed contact Address of the project participant is given in Annex 1.



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:

>>
20/08/2005

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

>>
30y-0m

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

C.2.1. Renewable crediting period

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

>>
01/04/2008 or date on which the registration occurs

C.2.1.2. Length of the first crediting period:

>>
7y-0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

**SECTION D. Environmental impacts**

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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According to Indian regulation, the implementations of biomass plants do not require an Environmental Impact Assessment (EIA). The Ministry of Environment and Forests (MoEF), Government of India notification dated June 13, 2002 regarding the requirement of EIA studies as per the Environment Protection Rule, 1986 (MoEF, 2002) states that any project developer in India needs to file an application to the MoEF (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list.

Though the project does not require conducting EIA as per MOEF rules, by considering the high level of investment involved in the project, the project promoter has conducted EIA study.

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:

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Environmental Protection and the control of solid, liquid and gaseous effluents or emissions are key elements in the design of all steam and power generating systems. The emissions from combustion systems are tightly regulated by State and Central Governments and there are specific rules and requirements that are constantly changing. The measures taken to reduce the environmental impacts of the cogeneration power plant project are in following areas:

Air:

The elements polluting the air that are discharged from the power plant are- dust particulate from fly ash in flue gas, nitrogen oxide and sulphur di oxide. The Pollution Control Regulation limits the particulate matter emission from bagasse fired steam generators as 150 mg/Ncum. MCM has taken this step of installation of Electrostatic precipitator (ESP) for reduction of particulate emission to 50 Mg/Ncum to save the environment from dust emission. There is no sulphur in bagasse and hence the criterion for fixing stack height based on sulphur di oxide emissions is not applicable here. The temperatures encountered in the steam generator while burning high moisture bagasse are low enough not to produce nitrogen-oxides. The fly ash collected from the ESP hoppers; air heater hoppers and furnace bottom hoppers can be used for landfill. The high potash content in the bagasse makes the ash good manure. It is mixed with filter mud obtained from sugar plant, which has good land nutrient value, and this mixture would be sold to the farmers to be used as manure in cane fields.

Water:

The acid and alkali effluents generated during the regeneration process of the ion exchangers would be drained into an epoxy lined underground neutralizing pit. Generally these effluents are self-neutralizing. However, provisions are made so that the effluents will be neutralized by addition of either acid or alkali to achieve the required pH of about 7.0. Wastewater would be treated before discharge i.e. they would be subjected to filtration and clarification. The oily water will be treated separately to remove oil/ grease before discharge into effluent ponds. Clarification is used to settle out large suspended particles and



condition smaller colloidal particles to make them settle. The treated water would be used for greenery development and cane farms. A close circuit cooling water system with cooling towers would eliminate letting out of high temperature water into the canals and prevents thermal pollution.

Noise:

The rotating equipment in the power plant will be designed to operate with a total noise level not exceeding 85 to 90db (A) as per the requirement of the Occupational Safety and Health Administration (OSHA) Standards. The rotating equipments are provided with silencers whenever required to meet the noise pollution.

As all the necessary pollution control measures to maintain the emission levels of dust and SO₂ are taken and other effluents will be treated in the effluent treatment plant, there will be no adverse impact on either the air or water quality in and around the power plant site.

The impacts identified on various components of environment are studied during two different phases - construction phase and operational phase. The important aspects of the report are summarized as follows:

During Construction Phase

The proposed installation of the plant is in remote area. The installation of the power plant would have positive a effect on landscaping. Project proponents will improve the aesthetics of the surroundings. The land section was under agriculture and therefore, construction would not require any tree to be uprooted. There are no endangered species to be uprooted for the project.

At initial stages of construction itself, a bore well shall be constructed for meeting the requirements of construction and also drinking water, for which necessary treatment facilities shall be installed. There would be short-term negative impacts on various components of socio-economic environment due to the increase of population comprising of the workforce. However, by providing adequate housing, water, and power and sanitation facilities for the construction workforce, these impacts shall be contained within the site. Contractors shall also arrange adequate cooking fuel. Thus, this short-term negative impact may be contained within the site and minimized. Further, there is a small village close to the construction site. Bulk of the requirement of unskilled labor shall be met from this village, thereby significantly reducing the short-term negative impact.

During Operational Phase

The thermal energy emitted in the environment by power generating stations has long-term negative impacts. However, the proposed installation is insignificantly small to bring about climatic changes. Furthermore, the plant is based on a renewal form of energy – biomass. The air pollution from the burning of such fuel is less harmful as they contain lesser quantity of sulphur (~0.6%) as fossil fuels. Particulate emissions would be prevented by ESP (control equipment) and thus minor negative long-term impact on air environment is envisaged. An electrostatic precipitator installed with the boiler would capture almost the entire quantity of ash thereby practically eliminating all particulate related problems.

Requirements of water are proposed to be meet with the bore well available at the site. The yield of the ground water and potential for sustained availability has been established. No surface water bodies are available in the vicinity & therefore, would not be exploited for operation of the plant, thus surface water would not receive any impact. Further, the blow down water & effluents used for green belt development, ash quenching and sprinkling over heaps of fuel would percolate to the ground water and



would cause recharge of the ground water body to a sizable extent. Thus, long-term negative impact of moderate magnitude is anticipated on the ground water during operational phase of the plant.

The ecological environment shall have no impact due to operation of the plant.

GHG emission reduction

There would be contribution towards global environmental improvement due to positive impact of the plant on reduction of green house gas emission. Power generation from biomass is fundamentally carbon dioxide emission free due to the recycling of the carbon through the plant route. Thus, the entire quantity of power can be considered to substitute fossil fuel generated power. The project proponent would explore possibility of getting emission credits under CDM of Kyoto Protocol.

Social impact

The socio-economic environment shall be impacted due to the minor increase in population. This will be reduced as the plant enters the operational phase after the construction phase. A very low negative long-term impact is envisaged on demography, sanitation, health and education aspects. Moderate long-term negative impacts due to an increase in traffic are also anticipated for the operational phase, the effect of which would be reduced by the implementation and maintenance of roads.

Due to the requirement of skilled workmen and labor in the power plant, there would be an increase in earning capacity of the local population. Similarly, the increased production in the industrial area would enhance trade and commerce related activities. There would be further income generation through primary and secondary employment opportunities in the plant and in the operation of fuel logistics.

No negative environmental impacts will occur as a result of the project activity. The positive environmental impacts arising from the project activity are: a reduction in carbon dioxide emissions from the replacement of fossil fuels that would be generated under the baseline scenario.

**SECTION E. Stakeholders' comments**

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

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The stakeholders identified for the present project are as under:

- Village Panchayat
- Uttar Pradesh Power Corporation Ltd. (UPSEB)
- Uttar Pradesh Pollution Control Board (UPPCL)
- Project consultants
- Equipment Suppliers

Name of the Stakeholder	Description	Status
Village Panchayat	Accords permission for setting up of the project under the jurisdiction of the village. The village Panchayat /local elected body of representatives administering the local area are a true representative of the local population in a democracy like India. Hence the public comments received from the village Panchayat / elected body of representatives administering the local area give a proper reflection of the opinions of the local people. The village representative in the Village was also approached and also expressed their consent to operate.	The project proponent approached the village panchayat, the local body has appreciated the project and there are no comments received.
Uttar Pradesh Power Corporation Limited (UPPCL)	UPPCL, a regulatory body that purchases power from the MCM. Accords clearances for setting up of industries in the state. The project has completed the necessary agreement from UPPCL.	Achieved
Uttar Pradesh Pollution Control Board (UPPCB)	UPPCB, a regulatory body to monitor environmental impacts and environmental management of industries. Accords clearances for setting up of industries in the state after ensuring adherence to the statutory regulations. Also gives consent to start the operation of the project if satisfied with the environmental management and pollution control measures. The project has acquired the necessary clearances from UPPCB.	Achieved



Project Consultants (Consultancy)	Project consultants were involved in the project activity to take care of various pre-contract and post-contract project activities like preparation of Detailed Project Report (DPR), preparation of basic and detailed engineering documents, preparation of tender documents, selection of vendors / suppliers, and supervision of project implementation.	Completed
Equipment Suppliers	Supplied the equipment as per the specifications finalized for the project and are responsible for successful erection & commissioning of the same at the site.	Completed

E.2. Summary of the comments received:

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Name of the Stakeholder	Clearances and Summary of comments
Village Panchayat	Achieved. No comments received.
UPPCL	Achieved. No comments received.
UPPCB	Achieved. No comments received.
Project Consultants	No comments received.
Equipment Suppliers	No comments received.

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

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No comments have been received.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

Organization:	Mankapur Chini Mills (MCM)
Street/P.O.Box:	AJC Bose Road
Building:	FMC Fortuna II nd floor, 234/3A
City:	Kolkata
State/Region:	West Bengal
Postfix/ZIP:	700 020
Country:	India
Telephone:	+91-33- 2287 4749
FAX:	+91-33- 2240 3083
E-Mail:	kshah@chinni.com
URL:	www.chinni.com
Represented by:	
Title:	Director and Chief Financial Officer
Salutation:	Mr.
Last Name:	Shah
Middle Name:	
First Name:	Kishore
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2**INFORMATION REGARDING PUBLIC FUNDING**

There is no funding from Annex- I parties



Annex 3

BASELINE INFORMATION

The Indian power grid system is divided into five regions namely Northern, Southern, Eastern, Western and North Eastern regions. These regions have independent load dispatch centres. The Northern region mainly consists of Delhi, Uttar Pradesh, Rajasthan, Uttaranchal, Haryana, Himachal Pradesh, Punjab and Jammu Kashmir states. Each state has its own State Electricity Boards / Corporations to manage its power generating plants.

In Uttar Pradesh state, Uttar Pradesh Power Corporation Limited (UPPCL) manages the power transmission and distribution. Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited (UPRVUNL) manages all the thermal power generation plants in the state and the hydro power plants are managed by Uttar Pradesh Jal Vidyut Nigam Limited (UPJVNL). National Thermal Power Corporation (NTPC) and National Power Corporation (NPC) manage the central government owned power generation plants.

The relevant grid for the determination of the combined margin is the Northern region grid. This is because although electricity generation and distribution remains largely in the hands of the Uttar Pradesh Power Corporation Limited, the regional grid is becoming more integrated. Moreover, central sector generation from the entire Northern region is transmitted to UP.

Determination of the Carbon Intensity of the chosen Grid

Complete analysis of the system boundary's electricity generation mix has been carried out for calculating the emission factor of Northern Regional Grid by Central Electric Authority (CEA) of India in its CO₂ Baseline Database Version 03 dated 15th December 2007. The project proponent has used this analysis for computation of the grid emission factor. For more information please refer to <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>. The combined margin grid emission factor computed from the above analysis is thus 0.787118tCO₂/MWh for the Northern Regional Grid.

The baseline information and the determination of the baseline scenario considered the most conservative baselines for the generation of power, the generation of heat and the use of biomass is clearly demonstrated in section B.



Annex 4

MONITORING INFORMATION

The Monitoring and Verification (M&V) procedures define a project-specific standard with which the project's performance (i.e. GHG reductions) and conformance on all relevant criteria is to be monitored and verified. It includes developing suitable data collection methods and data interpretation techniques for the monitoring and verification of GHG emissions with a specific focus on technical/efficiency/performance parameters. It also allows for the review, scrutiny and benchmark of all this information for conformity with the reports that pertain to M & V protocols.

The M & V Protocol provides a range of data measurement, estimation and collection options/techniques for each case, indicating the preferred options consistent with good practices, to allow project managers and operational staff, auditors, and verifiers to apply the most practical and cost-effective measurement approaches to the project. The aim is to enable promoters of the project activity to have a clear, credible and accurate set of monitoring, evaluation and verification procedures. The purpose of these procedures would be to direct and support continuous monitoring of project performance/key project indicators to determine project outcomes and greenhouse gas (GHG) emission reductions.

The project revenue is based on the units generated, which are measured by power meters at the plant. The monitoring and verification system mainly comprise of these meters as far as power for auxiliaries and export is concerned. The biomass, as an input, is also to be monitored. The measurement of the quantity of biomass used will produce evidence that the energy is being generated with zero net CO₂ emissions.

The project activity employs the latest state of art monitoring and control equipment that measures, records, reports, monitors and controls various key parameters. Parameters monitored are the quantity and the quality of the biomass fuel used, total power generated, power for auxiliary purposes etc. All monitoring and control functions will be done as per the internally accepted standards and norms of the plant.

The instrumentation system of the project activity will mostly comprise of microprocessor – based instruments of reputed make with the desired level of accuracy. All instruments will be calibrated and marked at regular intervals so that the accuracy of measurement can be ensured at all times.

The emission reductions from the project activity mainly depend on the project emissions of GHG sources and the baseline emissions, and are due to the displacement of fossil fuel generated electricity in the grid system.

OPERATIONAL PARAMETERS OF THE PROJECT ACTIVITY

Total Power Generated

The total power generated by the power project will be measured in the plant premises with the best accuracy and will be recorded and monitored on a continuous basis through the DCS.

Power consumed by the plant auxiliaries

The power consumed by plant auxiliaries will be recorded in the plant premises with the best accuracy. The total quantum of power consumed by the auxiliaries would affect the total power exported to the grid



and thus the amount of GHG reductions. Therefore, any increase in the consumption pattern of the auxiliary system will be attended to.

Power consumed by the plant

The power exported to grid will be recorded in the plant premises with the best accuracy. The total quantum of power consumed by the plant would affect the total power to the exported to the grid and thus the amount of GHG reductions. Therefore, any increase in the consumption pattern will be attended to.

All the above parameters/factors will demonstrate the performance of the project at any point of time.

Verification

The performance of the biomass based power project leads to CO₂ emission reductions. In other words, the longer the cogeneration power plant runs, generating power, the more emission reductions there are. The project control system comprises a state of the art sophisticated control and monitoring system like the Distributed Control System. It measures and collects the information on various process parameters, records, monitors and controls on a continuous basis. Fully functional management information systems were built in the DCS so that the access and verification of actual data is possible at all times. The major activities to be verified are as under:

- Verification of various measurement and monitoring methods
- Verification of instrument calibration methods
- Verification of data generated by the DCS
- Verification of measurement accuracy

The following major project parameters need to be verified, based on the available operating data, as they can affect the emission claims:

- The cane crushing by sugar unit
- The quantity of bagasse
- The efficiency of project activity
- The total generation of power, the captive and auxiliary power requirements, the power export to the grid
