PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)
Version 04.1

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Ganpati co-generation project at Medak, Andhra Pradesh
Version number of the PDD	05
Completion date of the PDD	23/11/2010
Project participant(s)	-Ganpati Sugar Industries Limited, India -Noble Carbon Credits Limited (United Kingdom of Great Britain and Northern Ireland) -Vitol S.A (Switzerland)
Host Party(ies)	India
Sectoral scope(s) and selected methodology(ies)	Sectoral Scope: 01, Energy industries (renewable - / non-renewable sources) AMS-I.C. ver. 17
Estimated amount of annual average GHG emission reductions	46,980 metric tonnes CO2 equivalent per annum

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project activity consists of set up of bagasse co-generation facility at Ganpati Sugar Industries Limited's (GSIL) sugar mill at Sanga Reddy, Medak District of Andhra Pradesh, India. The bagasse to be used as fuel is the bagasse generated by the sugar mill.

Started in 2001 (project implementation), the project activity was among the first in India consisting of a high pressure boiler configuration (most sugar mills in India having co-generation units operate with low pressure boiler configuration of below 45 kg/cm2 (majority are in the range of 21 kg/cm2 to 45 kg/cm2) to cater to the in-house steam and power requirements). On the date of finalisation of the project, there were less than 4 similar projects implemented and operational in India, of which 3 were in the state of Tamil Nadu. The relatively low efficiency being a design choice historically made in the Indian sugar industry to eliminate the build-up of mountains of bagasse that represents an environmental and fire hazard. Despite being an in-efficient utilization of resources, most sugar mills continue to operate under this Business as Usual scenario.

In India, the major sugar cane growing states are as under:

State	Area under cultivation	GROWING SEASON	Crushing days per annum
Uttar Pradesh (03-04)	2030000 Hectares	Sept – April	120 – 130 days
Maharashtra (03-04)	536000 "	"	100 – 160 days
Karnataka (03-04)	237000 "	"	100 – 200 days
Andhra Pradesh (03-04)	203000 "	"	100 – 160 days
Tamil Nadu (03-04)	185000 "	"	120 – 200 days

As per the various sources available, of the approximately 507 sugar mills in India, with a total potential for bagasse co-generation in excess of 3,500 MW[1], only 38 mills have co-generation facility (installed capacity a mere 226 MW[2]. Of these 38 mills, only 12 are of high-pressure configuration similar to that of the proposed project. This would confirm the fact that owing to historical and other operating / economic reasons, co-generation projects with high-pressure configurations and especially export of power to the regional Grid is NOT a standard / common practice.

Under planned economy concept, the Government initially permitted small sized new units of 1250 TCD capacity only and later on increased the minimum economic size of plant to 2500 TCD and has recently increased this to 5000 TPD. Such policies of the government led to the sugar industry growing horizontally with an all India per unit average capacity of 2690 TCD.

The additional revenue, together with the enhanced project profile was a critical factor responsible for convincing the management of GSIL to consider investing in the proposed project. Details to establish this can be verified from documents available for inspection to the Operational Entity.

Project Description	Location	Status
Co-generation unit – fuel bagasse	Sanga Reddy Mondal, Medak District, Andhra Pradesh, India	Commenced operations – January 2003. Currently in the process of securing registration under the CDM, as additional revenue from the sale of the CERs was a critical factor in the investment decision making process.

[1] Source: http://www.mnes.nic.in/business%20oppertunity/pgtbp.htm

[2] http://www.mnes.nic.in/annualreport/2001_2002_English/ch5_pg11.htm

Contribution to Sustainable Development in the Host Country:
The project activity has contributed to the sustainable development of the host country on account of:

1. Green House Gas emissions reduction: it is estimated that the projects would result in a cumulative GHG emissions reduction in excess of 1 million tones of CO_2 equivalent over a period of 21 years.
2. Generating employment – other than direct plant related opportunities that will employ very minimally, there would be employment opportunities in material collection etc.

The Designated National Authority for CDM in India, which is the Ministry of Environment & Forests, has stipulated the following indicators for sustainable development in the interim approval guidelines for Indian CDM projects. The project has received the host country endorsement and the reference no is 4/22/2005-CCC. The project complies with the stipulations as under:

- **Social well being***:* The CDM project activity quite clearly leads to the alleviation of poverty by generating additional employment, removal of social disparities and contribution to provision of basic amenities to people leading to improvement in quality of life of people.
  This is being achieved as the project results in additional employment opportunities for the people residing in the economic zone around the sugar mill.

- **Economic well being*:*** The CDM project activity should bring in additional investment consistent with the needs of the people. This is being achieved as the project has resulted in direct / indirect investments to the tune of INR 5300 lacs. Had the project not been implemented, this investment would not have been made in the specific region/area.

- **Environmental well being**: This should include a discussion of impact of the project activity on resource sustainability and resource degradation, if any, due to proposed activity; bio-diversity friendliness; impact on human health; reduction of levels of pollution in general. This is clearly being achieved as the project uses factory-generated bagasses to generate power. In addition, the proposed energy plantation over dry / arid land (if successfully implemented) would result in a significant improvement of the quality of life for the people in the region.

- **Technological well being:** The CDM project activity should lead to transfer of environmentally safe and sound technologies with a priority to the renewables sector or energy efficiency projects that are comparable to best practices in order to assist in up gradation of technological base. This is being complied with as the technical configuration used for the project had been previously employed in less than 3 % of bagasses co-generation projects in the country. This high-pressure configuration has not been used in any public sector sugar mill till date.

Each of the above indicators has been studied in the context of the project activity to ensure that the project activity contributes to the sustainable development.

A.2. Location of project activity
A.2.1. Host Party(ies)
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India

A.2.2. Region/State/Province etc.
>>
Andhra Pradesh

A.2.3. City/Town/Community etc.

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Sanga Reddy Mondal, Medak District, Andhra Pradesh, India

A.2.4. Physical/ Geographical location

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The project site is located at Kulbagur, Fasalwadi Village,Sanga Reddy Mandal, Medak District of Andhra Pradesh (latitude 17 ° 38’17” N and longitude 78 ° 7 ’17” E some 75 Km from Hyderabad)

The following maps show the location of the sugar plants - **Andhra Pradesh + Hyderabad in the map of India**

a. Map of Andhra Pradesh – highlighting the Medak District

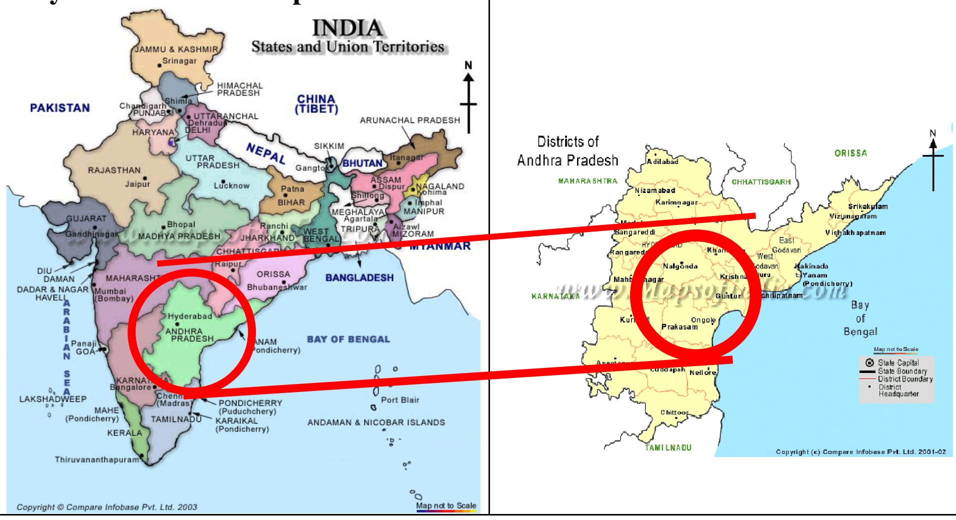

Figure 1

A.3. Technologies and/or measures

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The project activity is a small scale project activity and conforms to Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

Details of project type and category

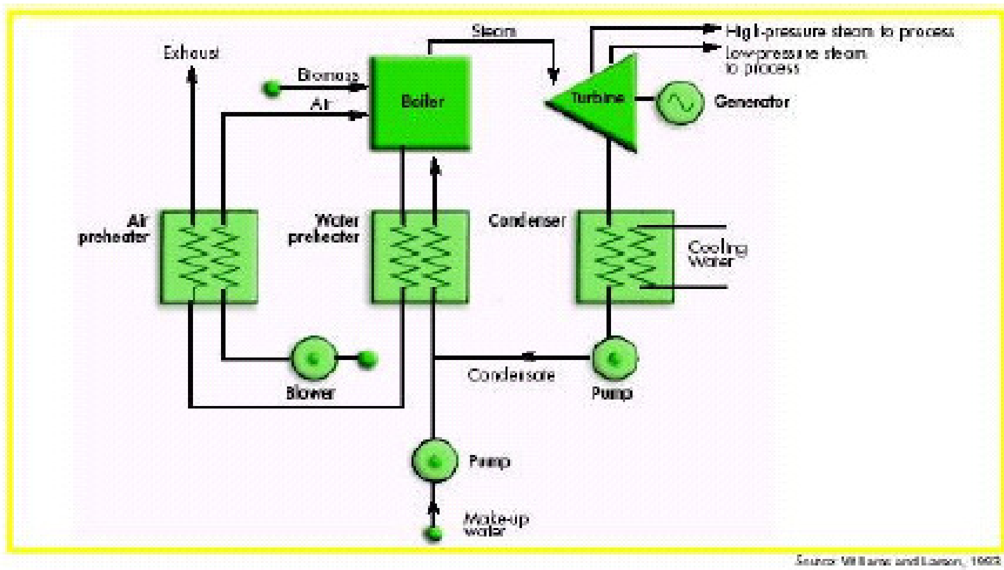
Type I – Renewable Energy Projects, AMS.I.C Version 17 – Thermal energy production with or without electricity

The predominant technology in all parts of the world today for generating megawatt (MW) levels of electricity from biomass is the steam-Rankine cycle, which consists of direct combustion of biomass in a boiler to generate steam, which is then expanded through a turbine. Most steam cycle plants are located at industrial sites, where the waste heat from the steam turbine is recovered and used for meeting industrial – process heat needs.

The Steam – Rankin cycle involves heating pressurised water, with the resulting steam expansion driving a turbine generator, and then condensing back to water for partial / full recycling to the boiler. A heat exchanger is used in some cases to recover heat from the flue gases to preheat combustion air, and a derater is used to remove the dissolved oxygen from water before it enters the boiler.

Steam turbines are designed as either “backpressure” or “condensing” turbines. Combined Heat and Power (CHP) applications typically employ backpressure turbines, wherein steam expands to a pressure

that is still substantially above ambient pressure. The steam leaves the turbine in vapour form and is then used to satisfy industrial heating needs, where it condenses back to its liquid form. It is then partially or fully returned to the boiler. Alternatively, if process steam demands can be met using only a proportion of the available steam, a condensing-extraction steam turbine (CEST) might be used. This design includes the capability for more steam to be extracted at one of more points along the expansion path for meeting the process needs. Steam that is not extracted continues to expand to sub-atmospheric pressures, thereby increasing the amount of electricity per unit of steam compared to the back pressure turbine. The non extracted steam is converted back to liquid water in a condenser that utilises ambient air and/or a cold water source as the coolant[3].



Source : Williams & Larson, 1993 apud Kartha & Larson, 2000 p.101

The steam-Rankine cycle uses different boiler designs, depending on the scale of the facility and the characteristics of the fuel being used. The initial pressure and temperature of the steam, together with the pressure to which it is expanded, determines the amount of electricity that can be generated per kilogram of steam. In general, the higher the peak pressure and temperature of the steam the more efficient, sophisticated and expensive the cycle is.

The project is a grid connected sustainably grown biomass based co-generation power plant with a high pressure steam turbine configuration. The plant is designed to operate with boiler outlet steam parameters 75 MT/Hr, of 67 kg/cm 2 and 480oC using bagasse as the primary fuel and other biomass as secondary fuel. Where as at the inception itself the boiler was derated to 55 TPH.

The net export to the grid during the season[4] will be 10.36 MW and during off-season it would be 11 MW.

PROJECT DETAILS		
	Old	**Project activity**
Boiler		
Capacity	35 TPH x 2	55 TPH

[3] Williams & Larson, 1993 and Kartha & Larson, 2000 p. 101

[4] Under the normative condition the season period in the state of Andhra pradesh is considered as 180days (i.e. crushing will happen only for 180days). Being operated by an efficient high-pressure boiler the power plant can operate for another 37days based on the saved Bagasse. Hence the total days of operation considered for the project is 217 days in a year

Temperature	380° C	480°C
Pressure	32 Kg cm^2 (ATA)	67 Kg cm^2
Numbers	2	1
Turbine		
Capacity	3 MW	15 MW
Temperature	380°C	480°C
Pressure	32 Kg cm^2	
Numbers	2	
Export to Grid		
Season	Nil	10.36 MW
Off – Season	Nil	11.00 MW

The Indian Sugar sector being highly dependent on supply of locally grown sugar cane, which in turn is dependent on the monsoons, is a highly cyclic industry. GSIL aims to expand the surplus power generation of the mill's co-generation system and add value to the bagasses from its sugar milling process.

GSIL invested a total of INR 1756 lacs for the acquisition of a new boiler providing 75 tons of steam per hour at 480° C and 67 bar multi drawel condensing type turbo generator, replacing two existing 3MW, low pressure configuration co-generation unit. The project included the setting up of a 10 Km transmission line, an energy sub station and other related infrastructure to facilitate the sale of surplus power to the regional Grid.

The initial Power Purchase Agreement entered into with the Transmission Corporation of Andhra Pradesh Limited for the sale of power to the grid at INR 2.25 per KW Hr (base year 1994-95 with a 5% annual escalation), for a period of 4 years upto 31st March 2004.

It should be pointed out that this is currently under dispute, with the transmission company reducing the effective rate and filed a case in Supreme Court to revise the tariff. This incidence further highlights the risks (and thus a critical barriers) of setting up small power plants with a view to exporting power to the Grid.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host Party)	Ganpati Sugar Industries Limited (Project participant)	No
United Kingdom of Great Britain and Northern Ireland	Noble Carbon Credits Limited	No
Switzerland	Vitol S.A	No

A.5. Public funding of project activity

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

A.6. Debundling for project activity

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Appendix C, paragraph 2 of the Simplified Modalities and Procedures for Small –Scale CDM project activities states:

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

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

As there is currently no registered CDM project at the site either large scale or small scale, the project will meet the criteria on debundling.

SECTION B. Application of selected approved baseline and monitoring methodology
B.1. Reference of methodology
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The approved baseline and monitoring methodologies applied for the project activity are:

AMS.I.C	Thermal energy production with or without electricity	Version 17, Sectoral Scope: 01, EB 54

Tools referenced in this methodology:
Tool to calculate project or leakage CO2 emissions from fossil fuel combustion
Tool to calculate baseline, project and/or leakage emissions from electricity consumption
Tool to determine the baseline efficiency of thermal or electric energy generation systems

B.2. Project activity eligibility
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The table below justifies how the project activity complies with the various criteria set in methodology.

Project applicability under AMS-I.C "Thermal energy production with or without electricity"

Applicability Criteria	Justification
This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	The project activity is a co-generation system based only on bagasse which is a renewable source of energy. The project activity displaces fossil fuel based electricity generation from the grid using renewable fuel, bagasse. Thus this applicability condition is applicable.
Biomass-based co-generating systems that produce heat and electricity are included in this category. For the purpose of this methodology "Cogeneration" shall mean the simultaneous generation of thermal energy and electrical and/or mechanical energy in one process.	The project activity is Bagasse based co-generation system, the electricity generated in this process is supplied to the regional grid. Thus, this applicability condition is applicable.
Emission reductions from a Cogeneration system can accrue from one of the following activities: (a) Electricity supply to a grid; (b) Electricity and/or thermal energy (steam or heat) for on-site consumption or for consumption by other facilities; (c) Combination of (a) and (b).	Emission reductions of the cogeneration project activity are solely on account of net electrical energy supplied to the grid.
The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45MW thermal (see paragraph 6 for the applicable limits for cogeneration project activities)	The project activity is Bagasse based co-generation system which generates electricity and exports net electricity to grid. Emission reductions of the cogeneration project activity are solely on account of electrical energy production. The total installed electrical energy generation capacity of the project equipment of the cogeneration unit is 15 MW.

For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal	The project activity is not a cofired system and is based solely on renewable fuel (bagasse). This category is not applicable as the system is not co-fired system.
The following capacity limits apply for biomass cogeneration units (a) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy (i.e., for renewable project activities, the maximal limit of 15 MW(e) is equivalent to 45 MW thermal output of the equipment or the plant); (b) If the emission reductions of the cogeneration project activity are solely on account of thermal energy production (i.e., no emission reductions accrue from electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal; (c) If the emission reductions of the cogeneration project activity are solely on account of electrical energy production (i.e., no emission reductions accrue from thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW.	Emission reductions of the cogeneration project activity are solely on account of electrical energy production (no emission reductions accrue from thermal energy component). The total installed electrical energy generation capacity of the project equipment of the cogeneration unit is 15MW and not exceeding the applicable capacity limits of Para 6(c).
In case electricity and/or steam/heat produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displaced.	The net electricity generation from the project activity is supplied to state electricity grid. A Power Purchase Agreement (PPA) entered into between Transmission Corporation of Andhra Pradesh Limited (APTRANSCO) and project proponent (GSIL) is in force now. Thus the applicability criterion is applicable to the project activity.
Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	The project activity is bagasse based co-generation system. The project activity does not involve any retrofit or modifications on the existing facility. Thus this criterion is not applicable to the project activity.

The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraphs 3 to 5 and should be physically distinct from the existing units.	The project activity does not involve the addition of renewable energy units at an existing renewable energy facility. Thus this criterion is not applicable to the project activity.
Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources	The activity is bagasse based co-generation system which is displacing the fossil fuel based electricity generation from the grid. The project activity does not involve any charcoal based energy generation.
If solid biomass fuel (e.g., briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in emissions reduction calculation	Not applicable

B.3. Project boundary

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

For the project activity the project boundary constitutes bagasse supply, boiler, turbine generator, transmission setup to grid, Kandi substation and all other accessory equipment. The emission reductions are calculated based on grid emission factor. Therefore Southern grid is included in the boundry. In the project activity electricity may be imported from grid and therefore Southern grid will be included for project emission purposes as well.

B.4. Establishment and description of baseline scenario

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The project produces renewable based electricity generation. The plant is grid connected and the electricity supplied from the project activity to the grid would be expected to replace existing and planned generation from the grid, the majority of which is fossil fuel based.

According to the Annex 11 of EB 46 Report “PROCEDURES FOR RENEWAL OF THE CREDITING PERIOD OF A REGISTERED CDM PROJECT ACTIVITY” paragraph 3 the ‘The demonstration of the validity of the original baseline or its update does not require a reassessment of the baseline scenario, but rather an assessment of the emissions which would have resulted from that scenario’

Therefore the project proponent has made the same baseline for the project activity during the renewable process and updated the baseline based on the current data available. As per Paragraph 17 of approved

methodology AMS.I.C, the baseline emissions for supply of electricity to and/or displacement electricity from a grid shall be calculated as per the procedures detailed in AMS-I.D.

Procedure detailed in AMS.I.D:
The baseline scenario for the electricity, generated from the project activity has been arrived in accordance with approved methodology AMS-I.D (version 16). The project activity involves electricity generation from bagasse based cogeneration plant which supplies the generated electricity to the regional grid. The electricity grid in India is dominated mostly by fossil fuel based power plants and the project activity will be replacing the fossil fuel based electricity generation, thereby reducing GHG emissions.

As referred in the methodology, Version 02 of "Tool to calculate the emission factor for an electricity system" has been used to determine continued validity of the baseline based on combined margin (CM) calculations. The operating and build margin factors have been taken from the published government data source 'CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE'[5]

Updated baseline for the second crediting period
As per AMS I.D version 16, Paragraph 11 states that "The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor"

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

Where:

BE_y	Baseline Emissions in year *y*; t CO2
$EG_{BL,y}$	Energy baseline in year *y*; kWh
$EF_{CO2,grid,y}$	Emission Factor in year y; t CO2e/kWh

Energy baseline ($EG_{BL,y}$) is the net electricity produced by the renewable generating unit delivered to the grid by the project that otherwise would have been generated by the operation of grid connected fossil fuel power plants.

The Emission Factor ($EF_{CO2,grid,y}$) can be calculated in a transparent and conservative manner as follows:

According to the Version 02 of "Tool to calculate the emission factor for an electricity system" baseline emission coefficient will be determined using the following steps:

STEP 1. Identify the relevant electricity systems.

The Indian electricity system is divided into two grids, the Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid. Each grid covers several states. As the grids are interconnected, there is inter-state and inter-regional exchange. For each of the two grids, the main emission factors are calculated in accordance with the relevant CDM methodologies.

Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state meets their demand with their own generation facilities and also with allocation from power plants owned by the central sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the central sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The regional grid thus represents the largest electricity grid where power plants can be dispatched without significant constraints and thus, represents the "project electricity system" for the Project.

[5] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

As the Project is connected to the Southern regional electricity grid, the southern grid is the "project electricity system".

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

Option I: Only grid power plants are included in the calculation.

STEP 3. Select a method to determine the operating margin (OM).

According to the tool the calculation of the operating margin emission factor is based on one of the following methods:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

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

The Share of Low Cost / Must-Run (% of Net Generation) in the generation profile of Southern Region in the five years is as follows

Share of Must-Run (% of Net generation)

	2004-05	2005-06	2006-07	2007-08	2008-09
South	21.6%	27.0%	28.3%	27.1%	22.8%

Baseline Carbon Dioxide Emission Database –Version 3.0 & Version 5.0, published by the Central Electricity Authority (CEA)

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) in southern region is less than 50% of the total generation. Hence the Simple OM method can be used to calculate the Operating Margin Emission factor.

The project proponents choose an ex-ante option for calculation of the OM with a 3-year generation weighted average, based on the most recent data available at the time of submission of the CDM PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period

STEP 4. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

• Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A), or
• Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B)

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information

obtained from all operating power stations in the country. This database i.e. The CO2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The CEA database uses the option B i.e. data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit, to calculate the OM of the different regional grids.

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

As per the Tool, The sample group of power units used to calculate the build margin consists of either:
(a) The set of five power units that have been built most recently; or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently

In accordance with the Grid Tool, the build margin is calculated in this database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. Depending on the region, the build margin covers units commissioned in the last five to ten years.

As per 'Tool to calculate the emission factor an electricity system' the build margin emission factor can be calculated for each crediting period using Option 1 which states 'For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period'. **Therefore, the Build Margin emission factor has been fixed ex ante for the second crediting period.**

STEP 6. Calculate the build margin emission factor.

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as per the Step 6 in Tool.

STEP 7. Calculate the combined margin (CM) emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \text{ x } w_{OM} + EF_{grid,BM,y} \text{ x } w_{BM}$$

Where:
EFgrid,BM,y =Build margin CO2 emission factor in year *y* (tCO2/MWh)
EFgrid,OM,y =Operating margin CO2 emission factor in year *y* (tCO2/MWh)
w_{OM} =Weighting of operating margin emissions factor (%)
w_{BM} =Weighting of build margin emissions factor (%)

As per step 7 of "Tool to calculate the emission factor an electricity system" The following default values should be w_{OM} = 0.25 and w_{BM} =0.75 for the second and third crediting period

The operating margin and the build margin emission factor have been considered from the information (Baseline Carbon Dioxide Emission Database –Version 5.0) published by the Central Electricity Authority (CEA), Ministry of Power, Govt. of India which have been computed according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system".

Annex 1 of "PROCEDURES FOR RENEWAL OF THE CREDITING PERIOD OF A REGISTERED CDM PROJECT ACTIVITY"

Annex 1 of "PROCEDURES FOR RENEWAL OF THE CREDITING PERIOD OF A REGISTERED CDM PROJECT ACTIVITY" i.e., as per "Tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period" provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism.

The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.

Step 1: Assess the validity of the current baseline for the next crediting period
The "Procedures for the renewal of the crediting period of a registered CDM project activity" approved by the CDM Executive Board require assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline.

The validity of the current baseline is assessed using the following Sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The baseline for the project activity is the electricity grid from which the project activity connected. The project activity is claiming the emission reductions from the exported quantity of electricity only. In absence of project activity this quantity of electricity would have been generated from the electricity grid mix. The baseline remains unchanged since there is no policy been revised and/or is currently in force as well, therefore the baseline scenario is still in compliance with all the relevant mandatory national and/or sectoral policies.

Step 1.2: Assess the impact of circumstances
The new circumstances do not have an impact on the baseline. The baseline value will be updated based on the current data available for the grid.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) is technically possible

As per the "Tool to determine the remaining lifetime of equipment", the remaining lifetime of the equipment is the time for which the existing equipment can continue to operate before it has to be replaced/discarded. As per this Tool, Project participant can use one of the following options to determine the remaining lifetime of the equipment:
(a) Use manufacturer's information on the technical lifetime of equipment and compare to the date of first commissioning;
(b) Obtain an expert evaluation;
(c) Use default value

An independent expert having relevant experience in evaluating the remaining lifetime for the type of equipment has been approached and requested to determine the remaining lifetime of the equipment. The analysis on the information evaluated is done based on "Conducting tests on the equipment, such as magnetic particle examinations, ultrasonic testing, and visual inspection". The expert has stated his method of evaluation and provided his expert evaluation conclusion stating the estimated remaining

lifetime of the equipment is 15years. The expert's opinion on lifetime of equipment had been presented to the DOE. On 14/06/2010, the assessment of remaining life time of the equipments had been done and confirmed that the remaining technical lifetime of the equipment of the project activity is 15years which exceeds the crediting period for which renewal is requested. As the remaining technical lifetime of the equipment is not less than the end of the crediting period for which renewal is requested, the current baseline holds good for this crediting period too.

Step 1.4: Assessment of the validity of the data and parameters
This step stipulates that "Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist any more as a result of the CDM project activity."

Application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline is valid for the second crediting period but data and parameters needs to be updated. Therefore step 2 is used

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline
This step is applicable since the Steps 1.1, 1.2, 1.3 and/or 1.4 showed that the current baseline needs to be updated. As evident from the explanation provided above the baseline scenario remains unchanged.

Updated the baseline emissions based on the latest approved version of the methodology applicable to the project activity for the subsequent crediting period, without reassessing the baseline scenario.

Step 2.2: Update the data and parameters
The updated Data and/or parameter are followed for estimating the baseline emissions

B.5. Demonstration of additionality
>>
Application of the tools for the demonstration and assessment of additionality of the project is used to demonstrate 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:

Step 0: Preliminary screening based on the starting date of the project activity.

a. The starting date of this project activity is 29/04/2001. This can be easily established by checking the receipts of the equipment + proof of acquisition.

b. At the point in time when the decision to opt for the modern co-generation power facility was being taken, Ganpati Sugar was faced with many difficult choices / alternatives viz.:

   - The sugar industry in India was faced with indifferent conditions, prices were low and most companies were just about breaking even. The owners of GSIL had set-up the sugar mill in 1997 at a cost of almost INR 5264 lacs. Without getting returns on its investment, the decision to invest another INR 5300 in a new project based on a configuration and technology that was not an established norm in India, was a very difficult decision, more so when the fact that the power plant would lie unused for almost half the year was considered. It must be pointed out that :

   - There was no legal / statutory requirement for the Company to set up the project;

- The State Electricity Boards, the primary customers were known to be unreliable as far as payment for power purchased was concerned.
- The Power Purchase Agreement being offered was for a limited period of 4 years upto 31st March 2004. ;

It was during this time that the Kyoto Protocol was being discussed in some details in the Indian media, partly due to the efforts of the USAID and other agencies. Mr. P.M. Nair one of the Directors of GSIL was instrumental in convincing the board that the proposed project could be developed under the CDM (refer Annex:5 for board minutes dated 13/06/2000) and the fact that the additional revenue from developing the project under the CDM could significantly enhance the projects financial viability while simultaneously generating a significant amount of positive coverage and image for the company. The fact that it would have been one of the first sugar companies in the country to be developed under the CDM too was an additional attraction in support of the decision.

Various documents and information pertained to comprehensively establish the fact, that the benefits of registering the project under the CDM was one of the key factors in pursuing the project can be made available to the Designated Operational Entity at the time of validation.

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

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

- In the absence of any applicable rules / laws / regulations the alternatives to the proposed project activity included the following: Continuing the BAU i.e. running the old low pressure configuration boiler and power system that generated adequate power to meet the internal requirements of the plant but not for exports. This in effect would lead to a continuation of the then prevailing scenario of the sugar mill with a focus on just the production of sugar;
- Set up a new co-generation power project based on a high-pressure boiler configuration and develop the project without considering the additional financial benefits under the CDM.

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

Sub clause 2.

- The alternative to continue with the BAU situation prior to the decision to implement this project is completely consistent with the applicable laws and regulations.

Sub clause 3 – not applicable

Sub clause 4:

- The project activity scenario and all the alternatives are in compliance with all applicable rules and regulations in the country.

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 project being one of the first of its kind in the Indian sugar industry was faced with significant investment barriers eg.

a. Real / perceived risks include :

i. Electricity Off take risk: State Electricity Board, the primary consumer & off taker do not enjoy a very good reputation and track record as far as timely payment of dues is concerned.
ii. Power Purchase Agreement Risk : The PPA was fixed for a period of 4 years upto 31st March 2004.. Considering the project life of 21 years, this was / is a very risky proposal. This is further borne out by the recent developments wherein the State Electricity Board has unilaterally decided to revise the PPA.
iii. Unfamiliar technology : Though the high pressure configuration was common in other parts of the world, the technology was new for the Indian sugar industry and thus perceived to be risky. Please note that GSIL was among the first few sugar mills to be exporting 10Mw + power to the grid, prior to this, only 3 out of the 507 sugar mills in India were exporting power to the Grid

b. Access to funding:
i. Bank finance: In view of the un-common configuration of the project, banks were reluctant to extend financing to the project. The problem was compounded by the fact that the primary (and only) buyer for the power to be generated was the State Electricity Board and these did/do not have a good reputation as far as timely payment of dues is concerned.

ii. Equity Funding: The Board of GSIL was divided as far as investments in the new power project were concerned 13th June 2000. The resolution letter is being attached in Annex 5. With strong reservations being expressed about the financial viability of the project and its risks. Ultimately the argument that the project would be eligible for registration under the CDM (and its advantages) and the fact that it would be among the first Indian Sugar Mills to be registered helped convince the board about the merits of the projects.

(B) Technological barriers: The fundamental technological barrier was the fact that the project would be among the first with such a high pressure configuration. This was / is not a BAU practise in the Indian sugar Industry. The related barriers in terms of access to trained man power etc. were part and parcel of the project activity.

(C) Prevailing Practice: In addition to the high pressure configuration, the fact that the project was exporting power to the Grid resulted in additional capital expenditure to the tune on INR 5300 lacs on setting up the infrastructure to evacuate the power generated. This was an uncommon practice and contrary to BAU practices in the Indian Sugar Industry.

(D) Other barriers: These include Cultural and Management expertise and focus: Operating and managing a large sized power plant (comparatively speaking) requires a separate set of skills in terms of sourcing and organizing the fuel supply, meeting the maintenance needs and dealing with the primary customers and the related legal compliance etc. The management of GSIL was / is more focussed on manufacturing and trading sugar, an activity that requires a completely different set of skills and a completely different mind set. Management related issues were thus a significant implementation barrier, as power related activities received and continue to receive lower than the desired level of priority.

Details of the barriers to project implementation can be made available to the Designated Operational Entity at the time of validation.

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)

The barriers to the project activity do not affect the alternatives to the identified project option as:

Continuing the BAU i.e. running the old low pressure configuration boiler and power system that generated adequate power to meet the internal requirements of the plant but not for exports would not require any additional effort from the part of the management. Nor would it need additional resources and would thus not be affected by the barriers outlined above.

Please note that on account of the very high cost of the project, the related risks involved and the barriers as mentioned above, the second alternative i.e. to set up a new co-generation power project based on a high-pressure boiler configuration and develop the project without considering benefits under the CDM, is NOT a feasible option and thus would not have been implemented.

Step 4. Common Practice Analysis

Sub-step 4a: Analyse other activities similar to the proposed project activity:
The sugar sector, historically, has always exploited its biomass (bagasses) in an inefficient manner by making use of low-pressure boilers. Although they consume almost all the bagasse for self-energy generation purposes, it is done is such a manner that no surplus electricity is available for sale, and very few (if any) sugar company had ventured in the electricity market till very recently.

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

As explained, of the approximately 507 sugar mills in India, with a total potential for bagasse cogeneration in excess of 3,500 MW[6], only 38 mills have co-generation facility (installed capacity a mere 226 MW[7]. Of these 38 mills, only 12 are of high-pressure configuration as that of the project proposed this would confirm the fact that owing to historical and other operating / economic reasons, co-generation projects with high-pressure configurations and especially export of power to the regional Grid are NOT a standard practice.

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

Step 5. Impact of CDM registration

The registration of this CDM project activity, will contribute to overcome all the barriers described in this tool: Technological, institutional, economic, investment, cultural and management related barriers will all be significantly mitigated on 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 the 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 returns computation. The project developer plans to leverage the CERs generated form this project to set up another 20 MW biomass power generation project for exclusive export of power to the Grid. The registration of this project would significantly aid in that process.

[6] Source: http://www.mnes.nic.in/business%20oppertunity/pgtbp.htm
[7] http://www.mnes.nic.in/annualreport/2001_2002_English/ch5_pg11.htm

B.6. Emission reductions
B.6.1. Explanation of methodological choices
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Baseline Emissions

As per Paragraph 17 of approved methodology AMS.I.C, the baseline emissions for supply of electricity to and/or displacement electricity from a grid shall be calculated as per the procedures detailed in AMS-I.D.

As per AMS I.D version 16, Paragraph 11 states that "The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor"

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

Where:

BE_y	Baseline Emissions in year *y*; t CO2
$EG_{BL,y}$	Energy baseline in year *y*; kWh
$EF_{CO2,grid,y}$	Emission Factor in year y; t CO2e/kWh

Energy baseline ($EG_{BL,y}$) is the net electricity produced by the renewable generating unit delivered to the grid by the project that otherwise would have been generated by the operation of grid connected fossil fuel power plants.

The Emission Factor ($EF_{CO2,grid,y}$) is calculated according to the Version 02 of "Tool to calculate the emission factor for an electricity system" as detailed mentioned in section B.4

Simple OM emission factor has been sourced from the most recent data available at the time of submission of the PDD for renewal and has therefore been fixed for the crediting period.

Simple Operating Margin (tCO2/MWh)[8] (incl. Imports)				
Region	2006-07	2007-08	2008-09	Average of last three years
South	1	0.99	0.97	0.9867

The Build Margin emission factor has been fixed ex ante for the second crediting period.

Build Margin (tCO2/MWh)[9] (not adjusted for imports)	
	2008-09
South	0.82

Combined Margin: The combined margin emissions factor is calculated as follows:

[8] Central Electricity Authority (CEA): "CO2 Baseline Database", Version 05, November 2009. http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
[9] Central Electricity Authority (CEA): "CO2 Baseline Database", Version 05, November 2009. http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

As per step 7 of "Tool to calculate the emission factor an electricity system" The following default values should be w_{OM} = 0.25 and w_{BM} =0.75 for the second and third crediting period

Therefore, The Grid emission factor will be:

$EF_{grid,OM,y}$ (tCO2/MWh)	w_{OM}	$EF_{grid,BM,y}$ (tCO2/MWh)	w_{BM}	**$EF_{grid,CM,y}$** (tCO2/MWh)
0.9867	0.25	0.82	0.75	**0.86167**

Project emissions

As per paragraph 35 of the AMS.I.C version 17 methodology, Project emissions include:

- CO2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
- CO2 emissions from electricity consumption by the project activity using the latest version of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
- Any other significant emissions associated with project activity within the project boundary;

According to the operation of the project activity the following is the only source for the project emissions:

CO2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"

The project activity is renewal based electricity generation and can only fire bagasse as fuel (The local regulation also constraint use of fossil fuels for the bagasse based co-gen system implemented in sugar industry) and the emission reductions are calculated based on the net electricity supplied to the grid. Since it is not a cofired plant, the amount of fossil fuel input to the project activity need not to be monitored.

Fossil fuel combustion (diesel) in standby DG sets during trial runs and maintenance activities only (not for power generation purpose in the project activity) is included as a monitoring parameter. The consumption records of Diesel in DG set for maintenance purposes can be cross checked with the log books and purchase records. If diesel is consumed for the project activity, the project emissions from the same are calculated as below:

As per formula 1 provided in "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", Version 02, CO_2 emissions from fossil fuel combustion is as follows:

$$PE_{FC,j,y} = \sum FC_{i,j,y} \times COEF_{i,y}$$

For the project activity, since the CO_2 emissions from fossil fuel combustion are only from diesel consumption for electricity generation. The above formula can henceforth be referred as:

$$PE_y = FC_{diesel} \times COEF_{diesel}$$

Where :

PE_y Are the CO_2 emissions from diesel consumption during the year y (tCO_2/yr);

FC_{diesel} Is the quantity of diesel consumed in process during the year y (tons/yr), which equals to the Quantity of diesel consumed in litres/yr times the density of diesel (ρ_{diesel}) in kg/lit and divide by 1000 kg/ton to convert the unit of FC_{diesel} to tons/yr.

$COEF_{diesel}$ Is the CO_2 emission coefficient of diesel in year y (tCO_2/ton). $COEF_{diesel}$ is based on Option B of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". $COEF_{diesel} = NCV_{diesel} \times EF_{CO2, diesel}$

Option A for calculating the CO_2 emission coefficient is not used, as the necessary data is not available since the approach is based on the chemical composition of the fossil fuel type. Hence the preferred approach is Option B of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", Version 02, to calculate the CO_2 emission coefficient ($COEF_{i,y}$)

Therefore, Project emissions due to diesel consumption for electricity generation (PE_y) can be calculated finally as follows:

$PE_y = FC_{diesel} \times NCV_{diesel} \times EF_{CO2, diesel}$

Where:

FC_{diesel} Is the quantity of diesel consumed in process during the year y (tons/yr),

NCV_{diesel} Is net calorific value of the diesel (GJ/ton)

$EF_{CO2, diesel}$ Is the CO_2 emission factor of diesel in year y (tCO_2/GJ)

Leakage:

As per the guidance by the latest methodology AMS.I.C.Version 17, Para 37 states that "If the energy generating equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered". No leakage emissions are considered for the proposed project activity since no energy generating equipment is from outside the boundary to the project activity transferred from another activity and/or the existing equipment is transferred to another activity.

Further Para 38 states that "In case collection/processing/transportation of biomass residues is outside the project boundary CO2 emissions from collection/processing/transportation (If biomass residues are transported over a distance of more than 200 kilometres due to the implementation of the project activity then this leakage source attributed to transportation shall be considered, otherwise it can be neglected) of biomass residues to the project site". The biomass used in the project activity is the mill generated bagasse available with in the project premises. Collection/processing/transportation of bagasse is within the sugar plant and not outside the project boundary. Hence no leakage sources are considered and CO2 emissions from same are zero.

Emission Reductions:

Emission reductions are calculated as follows:

$ER_y = BE_y – PE_y – LE_y$

Where:

ER_y Emission reductions in year y (tCO2e)

BE_y Baseline emissions in year y (tCO2e)

PE_y Project emissions in year y (tCO2)

LE_y Leakage emissions in year y (tCO2)

Since the project emissions as well as the leakage are zero, the emission reductions are equal to the baseline emissions. These are calculated based on the monitored net amount of electricity supplied to the grid, and the baseline emission factor.

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data and parameter.)

Data / Parameter	$EF_{grid,OM,y}$
Unit	tCO_2e/MWh
Description	Simple operating Margin CO2 emission factor of the Southern regional grid
Source of data	Central Electricity Authority (CEA): "CO2 Baseline Database", Version 05, November 2009. http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) applied	0.9867 (Ex-ante)
Choice of data or Measurement methods and procedures	CEA has estimated the simple operating margin for the three years before the second crediting period. As per the tool the average need to be considered to fix the emission factor ex ante. Weight of 25% has been considered as 'Tool to calculate the emission factor for an electricity system' for the operating margin.
Purpose of data	This data is used to calculate the baseline emissions
Additional comment	The operating margin emission factor has been fixed for the second crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2e/MWh
Description	Build Margin CO2 emission factor of the Southern regional grid
Source of data	Central Electricity Authority (CEA): "CO2 Baseline Database", Version 05, November 2009. http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) applied	0.82 (Ex-ante)
Choice of data or Measurement methods and procedures	CEA has estimated the build margin for the last year (2008-2009). Weight of 75% has been considered as 'Tool to calculate the emission factor for an electricity system' for the build margin.
Purpose of data	This data is used to calculate the baseline emissions
Additional comment	The build margin emission factor has been fixed for the second crediting period.

Data / Parameter	NCV_{diesel}
Unit	GJ/ton
Description	Net calorific value of diesel
Source of data	"Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" & **IPCC** 2006 default values. Volume 2, Chapter 1: Introduction.
Value(s) applied	43
Choice of data or Measurement methods and procedures	As per "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", NCV_{diesel} is required to calculate the CO2 emission factor of diesel (i.e, $COEF_{diesel}$) and thereafter project emissions from diesel consumption. Since the data on NCV_{diesel} from neither the supplier nor its measurement procedures are available with PP, also there are no regional or national default values publicly available. IPCC 2006 default value is used as data source. NCV_{diesel} is 43GJ/ton value taken from IPCC 2006 default values. Volume 2, Chapter 1: Introduction. Any future revision of the IPCC Guidelines should be taken into account as per the tool.
Purpose of data	This data is used to calculate the project emissions
Additional comment	Data archived for Crediting period + 2 yrs

Data / Parameter	EF_{diesel} / $EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of diesel
Source of data	"Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" & **IPCC** 2006 default values. Volume 2, Chapter 1: Introduction.
Value(s) applied	0.0748
Choice of data or Measurement methods and procedures	As per "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", EF_{diesel} is required to calculate the CO2 emission factor of diesel (i.e, $COEF_{diesel}$) and thereafter project emissions from diesel consumption. Since the data on EF_{diesel} from neither the supplier nor its measurement procedures are available with PP, also there are no regional or national default values publicly available. IPCC 2006 default value is used as data source. EF_{diesel} is the CO2 emission factor of diesel 74.8 tCO2/TJ value taken from IPCC 2006 default values. Volume 2, Chapter 1: Introduction. Any future revision of the IPCC Guidelines should be taken into account as per the tool.
Purpose of data	This data is used to calculate the project emissions
Additional comment	Data archived for Crediting period + 2 yrs

B.6.3. Ex-ante calculation of emission reductions

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Emission Reductions:

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y - LE_y$
Where:
ER_y Emission reductions in year y (tCO2e)
BE_y Baseline emissions in year y (tCO2e)
PE_y Project emissions in year y (tCO2)
LE_y Leakage emissions in year y (tCO2)

Baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor.due to project activity:

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

$EG_{BL,y}$ is the net electricity generation supplied to the grid after considering captive and auxiliary consumption from the total electricity generation i.e., $EG_{BL,y}$ = 54,523 MWh/yr

$EF_{CO2,grid,y}$ Is the CO2 grid emission factor. For this project activity, the combined margin baseline emission factor value for the southern regional grid has been directly adopted from the CEA database. EF_{CO2} =0.86167 tCO/MWh

The project activity is renewal based electricity generation and can only fire bagasse as fuel (The local regulation also constraint use of fossil fuels for the bagasse based co-gen system implemented in sugar industry) and the emission reductions are calculated based on the net electricity supplied to the grid. Since it is not a cofired plant, the amount of fossil fuel input to the project activity need not to be monitored.

Fossil fuel combustion (diesel) in standby DG sets during trial runs and maintenance activities only (not for power generation purpose in the project activity) is included as a monitoring parameter. The consumption records of Diesel in DG set for maintenance purposes can be cross checked with the log books and purchase records.

Project emissions due to diesel consumption for electricity generation:

$PE_y = FC_{diesel} \times NCV_{diesel} \times EF_{CO2,\ diesel}$

PE_y (tCO2/yr)	FC_{diesel} (tonnes/yr)	NCV_{diesel} (GJ/ton)	EF_{diesel} / $EF_{CO2,i,y}$ (tCO2/GJ)
0	0	43	0.0748

Leakage:
No leakage emissions are considered for this project activity.

Emission Reductions:
Emission reductions are calculated as follows:
$ER_y = BE_y - PE_y - LE_y$

BE_y = 54,523 MWh/yr * 0.86167tCO/MWh = 46,980 tCO2 /yr
$PE_y = PE_{FC,j,y}$ = 0 tCO2 /yr
LE_y = 0 tCO2 /yr

Therefore, ER_y = 46,980 - 0 – 0 = 46,980tCO2 /yr

B.6.4. Summary of ex-ante estimates of emission reductions

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
2010	46,980	0	0	46,980
2011	46,980	0	0	46,980
2012	46,980	0	0	46,980
2013	46,980	0	0	46,980
2014	46,980	0	0	46,980
2015	46,980	0	0	46,980
2016	46,980	0	0	46,980
Total	328860	0	0	328860
Total number of crediting years	7y-0m			
Annual average over the crediting period	46,980	0	0	46,980

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each data and parameter.)

Data / Parameter	$EG_{BL,y}$
Unit	MWh
Description	Net electricity supplied to the grid by the project activity
Source of data	Monthly joint meter readings
Value(s) applied	54,523
Measurement methods and procedures	The Net electricity supplied to the grid by the project activity is calculated as: $EG_{BL,y}$ = (Electricity exported to the grid after meeting captive & auxiliary power requirements) – (Electricity Import from the grid). Total units exported to the grid and imported from the grid are measured by energy meters installed at APTRANSCO substation on 24th day of every month[10] and recorded by representatives of APTRANSCO (Grid operator) and project proponent (GSIL in a monthly Joint Meter Reading (JMR). The Net electricity supplied to the grid by the project activity ($EG_{BL,y}$) only be considered for CERs calculation purpose.
Monitoring frequency	Value: Calculated Measuring Frequency: Hourly Recording Frequency: Monthly
QA/QC procedures	Since this is a calculated value QA/QC procedures are not applicable
Purpose of data	This data is used to calculate the baseline emissions
Additional comment	Data is archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later

[10] Metering Date is subjected to the standards of the Agreement made with APTRANSO (as per the directions of Andhra Pradesh Electricity Regulatory Commission, Govt of AP).

Data / Parameter	$EG_{export,y}$
Unit	MWh
Description	Electricity exported to the grid after meeting captive & auxiliary power requirements during the year y
Source of data	Monthly joint meter readings
Value(s) applied	54,523
Measurement methods and procedures	Power export to grid is measured by energy meters installed at APTRANSCO substation on 24th day of every month. A monthly Joint Meter Reading (JMR) for the energy exported to the Grid is recorded by representatives of APTRANSCO (Grid operator) and project proponent (GSIL) The Net electricity supplied to the grid by the project activity (**EGy**) will only be considered for CERs calculation purpose.
Monitoring frequency	Value: Measured Measuring Frequency: Hourly Recording Frequency: Monthly
QA/QC procedures	This is cross checked with the bills raised by the company as well as the payment details by the grid operator as the Net electricity supplied to the grid by the project activity ($EG_{BL,y}$) only be considered for CERs calculation purpose. Meters based with best accuracy procured from reputed manufacturers are calibrated to national standards. Recalibration frequency is either subject to appropriate intervals according to manufacturer specifications or with a minimum frequency of once a year Accuracy: Class 0.2 Uncertainty level: Low
Purpose of data	This data is used to calculate the baseline emissions
Additional comment	Data is archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later

Data / Parameter	$EG_{import,y}$
Unit	MWh
Description	Electricity import from grid to the project activity during the year y
Source of data	Monthly joint meter readings
Value(s) applied	0
Measurement methods and procedures	Power imported from the grid is measured by energy meters installed at APTRANSCO sub station on 24th day of every month. A monthly Joint Meter Reading (JMR) for the energy imported from the Grid is recorded by representatives of APTRANSCO (Grid operator) and project proponent (GSIL) The Net electricity supplied to the grid by the project activity (**EGy**) will only be considered for CERs calculation purpose.
Monitoring frequency	Value: Measured Measuring Frequency: Hourly Recording Frequency: Monthly
QA/QC procedures	This is cross checked with the bills raised by the company as well as the payment details by the grid operator as the Net electricity supplied to the grid by the project activity ($EG_{BL,y}$) only be considered for CERs calculation purpose. Meters based with best accuracy procured from reputed manufacturers are calibrated to national standards. Recalibration frequency is either subject to appropriate intervals according to manufacturer specifications or with a minimum frequency of once a year Accuracy: Class 0.2 Uncertainty level: Low
Purpose of data	This data is used to calculate the baseline emissions
Additional comment	Data is archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later

Data / Parameter	$B_{Biomass,y}$
Unit	Tons
Description	Quantity of bagasse used in the project activity
Source of data	Plant Records
Value(s) applied	Value is based on estimate using annual energy/mass balance
Measurement methods and procedures	Value: Estimated
Monitoring frequency	Measuring & Recording Frequency: Yearly Estimated based on cane crushed, steam generation, bagasse production, open stock bagasse and closed stock bagasse etc
QA/QC procedures	Since this is a estimated value, QA/QC procedures are not applicable
Purpose of data	Value of data is not used for calculating expected emission reductions
Additional comment	Data is archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years

Data / Parameter	$NCV_{bagasse}$
Unit	GJ/ton
Description	Net calorific value of bagasse used in the project activity
Source of data	Plant Records
Value(s) applied	Value is based on Laboratory test
Measurement methods and procedures	Value: Measured Measured in Kcal/kg as per national standards and will be converted to GJ/ton as required by the methodology Value of data is not used for calculating expected emission reductions. The Net Calorific Value of bagasse on dry basis will be measured in laboratories by conducting laboratory test on annual basis according to national standards. Uncertainty level: Low. The consistency of the measurements is checked by comparing the measurement results with measurements from previous years.
Monitoring frequency	Measuring & Recording Frequency: Yearly
QA/QC procedures	The consistency of the measurements is checked by comparing the measurement results with measurements from previous years. Testing laboratory comply with national quality standards. Laboratory test is conducted periodically once in a year.
Purpose of data	Value of data is not used for calculating emission reductions.
Additional comment	-

Data / Parameter	$Moisture_{bagasse}$
Unit	%
Description	Moisture content of bagasse used in the project activity
Source of data	Plant Records
Value(s) applied	Value is based on Laboratory test
Measurement methods and procedures	Value: Measured
Monitoring frequency	Measuring Frequency: Monthly Recording Frequency: Yearly (The weighted average shall be calculated for each monitoring period as per the applied methodology) The moisture content of bagasse used in the project activity will be determined as per authorised laboratory test report.
QA/QC procedures	Calibration frequency is either subject to appropriate intervals according to industry standards or with a minimum frequency of once a year
Purpose of data	Value of data is not used for calculating emission reductions
Additional comment	-

Data / Parameter	$FC_{i,j,y}$ (Diesel)
Unit	Litres
Description	Quantity of diesel consumed in DG set for electricity generation used by project activity
Source of data	Plant Records
Value(s) applied	0
Measurement methods and procedures	Value: Measured Diesel in DG set is used only for emergency purposes (trail runs to maintain its running condition) and not for the power generation purpose in the project activity. The diesel quantity and source are maintained at the point of entry by stores department. Diesel once received by stores department will be issued to DG set department as and when required. Stores department maintains receipt, issue data everyday in excel sheet and takes issue slips from DG set department for the issued Quantity. The amount of diesel consumed by DG set is measured by using a level measuring gauge in the tank continuously and the same is cross verified with the issue slips
Monitoring frequency	Measuring Frequency: Continuously Recording Frequency: Daily
QA/QC procedures	The measuring equipment is calibrated at least once a year. The consumption of diesel can be cross checked with the log books to find whether DG set is used for power generation. Mostly diesel is used in the DG sets for keeping them in better running condition and rarely diesel may be used for emergency purposes, the amount of electricity generation from the DG set and corresponding diesel consumption for electricity generation is monitored.
Purpose of data	Data is used to estimate project emissions
Additional comment	-

B.7.2. Sampling plan

>>
Not Applicable

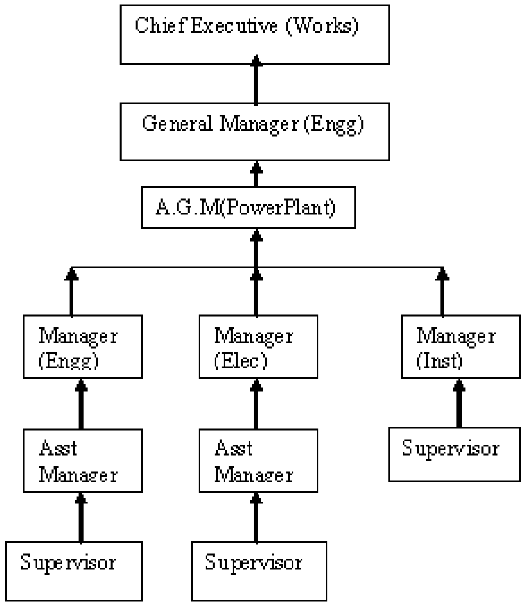
B.7.3. Other elements of monitoring plan

>>
As per paragraph 40 of the methodology, Monitoring plan of project activity is consisting of all parameters mentioned in section B.7.1 i.e., metering the energy produced by the project activity, quantity of bagasse used for project activity, NCV of bagasse, moisture content of bagasse, diesel consumption (if any) etc. The project revenue is based on the units exported as measured by power meters, main and check meters at the high-tension substation of the APTRANSCO. The amount of electricity exported to grid shown in Joint meter reading cards will only be considered for CERs calculation purpose.

The GSIL project activity has employed PLC (Programmable Logic Controller) system and Micro processor based instruments which will electronically monitor the main performance and output variables of the power plant, the systems for monitoring the CDM aspect of the project will draw extensively from the above system, monitoring and control equipment that measure, monitor and control various key parameters.

Operational and Management structure:

The operational and management structure of the co generation plant is provided in the following flow chart. The overall responsibility for ensuring the accuracy of the records as well as ensuring complete environmental integrity of the emissions reduction claims will rest with the Board, which has in turn appointed the Chief Executive (Works) to ensure that the details submitted are accurate.



Procedure for training monitoring personnel

Purpose is to establish a system for training and awareness of staff on monitoring and recording of clean development mechanism (CDM) related data. This procedure outlines the steps to ensure that staff receives adequate training to collect and archive complete and accurate data necessary for CDM monitoring. Orientation/induction training will be conducted for all new operational staff. All the Managers and AGM are responsible for this task. Training records will be maintained and initiated

Handling of Day-to-Day record: Purpose of the monitoring plan is to define the procedures and responsibilities for GHG Performance, Project Management, Registration, Monitoring, Measurement and Reporting of data and dealing with uncertainties.

AGM of the plant is responsible for the collation of data required to conduct the monitoring plan who will report to the GM. The management of the plant will put in place monthly reporting of electricity generation. Plant Manager would identify day to day information/data/record that needs to be maintained as per the CDM norms and prepare a record matrix/list for records as per the protocol of the CDM. Supervisors would maintain active files/registers/books for this data indexed in a manner to enable easy retrieval of specific data/record.

Reliability and calibration and maintenance of monitoring equipment:
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 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. Therefore the system ensures the final generation is highly reliable. AGM (Power Plant) will be responsible for getting the instruments checked and calibrated as per calibration schedule

INFORMATION ON ACCURACY & LOCATION OF MONITORING EQUIPEMENTS

Description	Main Meter	Check Meter	Generation meter
Accuracy Class	Class 0.2	Class 0.2	Class 0.2
Location	Kandi Substation	Kandi Substation	Generator terminal at control room
Purpose	To measure the electricity exported to APTRANSCO and electricity imported from APTRANSCO grid. The amount of electricity exported to grid measured by this meter and as shown in Joint meter reading cards will only be considered for CERs calculation purpose.	It is a stand by meter for export and import of electricity	Measures the total electricity generated from the project activity.

Uncertainties and Reliability:
The amount of emission reduction units is proportional to the net energy reduction due to the CDM Project. Measurement devices having good accuracy and procured from reputed manufacturers have been installed at site for the purpose of monitoring the various parameters of the Project. Since the reliability of the monitoring system is governed by the accuracy of the measurement system and the quality of the equipment for reproducibility, all instruments are calibrated as per the planned frequency for ensuring reliability of the system.

Emergency preparedness plan

Identify potential hazardous and emergency situations for the activities of different areas in consultation with the concerned heads/ managers. Make all concerned personnel aware of all the aspects & conditions that may lead to emergency situations. In the on site emergency plan all the emergency conditions, preparedness and response plan is described. Since the project activity does not result in any unidentified activity that can result in unpredicted and significant emissions from the project activity. Hence no major need is envisaged for emergency preparedness in data monitoring

Reporting procedures
The various measurements that need to be observed and recorded are identified as provided Section B of the PDD. Monthly reports are prepared stating the generation. In addition to the records maintained by the GSIL, APTRANSCO also monitors the power exported to the grid and certify the same. The data would be thus registered into softcopies for recording purposes.

Procedures for internal audit of GHG project compliance
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.

The internal audit and team will review all the records pertaining to power generation, power exported, checking monitoring equipments for accuracy and whether calibration was performed. The manager in association with the Supervisor shall answers all the queries raised by the internal audit team. The internal audit team will produce an audit report providing details of concerns that need to be attended to immediately before actual verification by the external verifier.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
29/04/2001

C.1.2. Expected operational lifetime of project activity
>>
21 years

C.2. Crediting period of project activity
C.2.1. Type of crediting period
>>
The project activity uses renewable crediting period

C.2.2. Start date of crediting period
>>
01/01/2003 (Synchronization to the grid)
First crediting period: 01/01/2003 to 31/12/2009
Second crediting period: 01/01/2010 to 31/12/2016

C.2.3. Length of crediting period
>>
7y-0m

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

The project being a renewable energy based power project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. As per the government of India notification date June 13, 2002 based on environment protection rule, 1986, public hearing and EIA is required for those industries/ projects, which are listed, in the predefined list of ministry of environment and forest. Thermal power projects with investment of less than Rs.100 Crores have been excluded from the list. Hence, not required by the host party.

The project has received host country endorsement form Designated National Authority, Ministry of Environment and Forest, Government of India.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

The local village regulators or Panchayats were approached for their comments and a meeting of the villagers chaired by the panchayat was called at the factory premises on 10th April 2000.

Letters of support for the project activity was received from the local Panchayat (local village administration units) and can be verified by the Operational Entity.

E.2. Summary of comments received

>>

In turn panchayat on 13th April 2000 of the local village was very supportive and appreciated the fact that would generate employment opportunities as well as create a market for their surplus biomass.

E.3. Report on consideration of comments received

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The comments were taken on record and as they were all in support of the project no action was deemed necessary.

SECTION F. Approval and authorization
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Approval and authorization from host party have been received.

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Appendix 1: Contact information of project participants

Organization	Ganpati Sugar Industries Limited
Street/P.O. Box	Road No. 4, Banjara Hills
Building	8-2-438/5
City	Hyderabad
State/Region	Andhra Pradesh
Postcode	500 034
Country	India
Telephone	91-40-23355212, 23355213, 23355214
Fax	91-40-23350959
E-mail	gsil_factory@yahoo.com, ganpatisugars@rediffmail.com
Website	
Contact person	
Title	President
Salutation	Mr.
Last name	Barasia
Middle name	
First name	Mahesh
Department	Commercial
Mobile	+91-9331018485
Direct fax	
Direct tel.	
Personal e-mail	barasia@hotmail.com

Appendix 2: Affirmation regarding public funding

There is no funding from Annex- I parties

Appendix 3: Applicability of selected methodology

As explained in section B above

Appendix 4: Further background information on ex ante calculation of emission reductions

As explained in section B above

Appendix 5: Further background information on monitoring plan

As explained in section B above

Appendix 6: Summary of post registration changes

Not applicable

- - - - -

History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9).
03	EB 28, Annex 34 15 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02	EB 20, Annex 14 08 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01	EB 07, Annex 05 21 January 2003	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		