



**CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02**

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**Revision history of this document**

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	<ul style="list-style-type: none">• 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.

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

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Ganpati co-generation project at Medak, Andhra Pradesh

Version 06

04/07/2006

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

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The project activity consists of the expansion / modernisation of the biomass co-generation facility at Ganpati Sugar Industries Limited's (GSIL) sugar mill at Sanga Reddy, Medak District of Andhra Pradesh, India. The biomass to be used as fuel would consist of 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 utilisation 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 MW¹, only 38 mills have co-generation facility (installed capacity a mere 226 MW². 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.

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

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



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.

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 CO₂ 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 bagasse 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 bagasse 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.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, Govt of India (Host Country)	Ganpati Sugar Industries Limited (Private entity, Project participant)	No

The official contact for the CDM project activity will be **Ganpati Sugar Industries Limited**.

Detailed contact address of above entity is given in Annex 1

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

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

>> Sanga Reddy Mandal, Medak District, Andhra Pradesh, India

A.4.1.1. Host Party(ies):

>>India

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

>>Andhra Pradesh

A.4.1.3. City/Town/Community etc:

>>Sanga Reddy

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

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

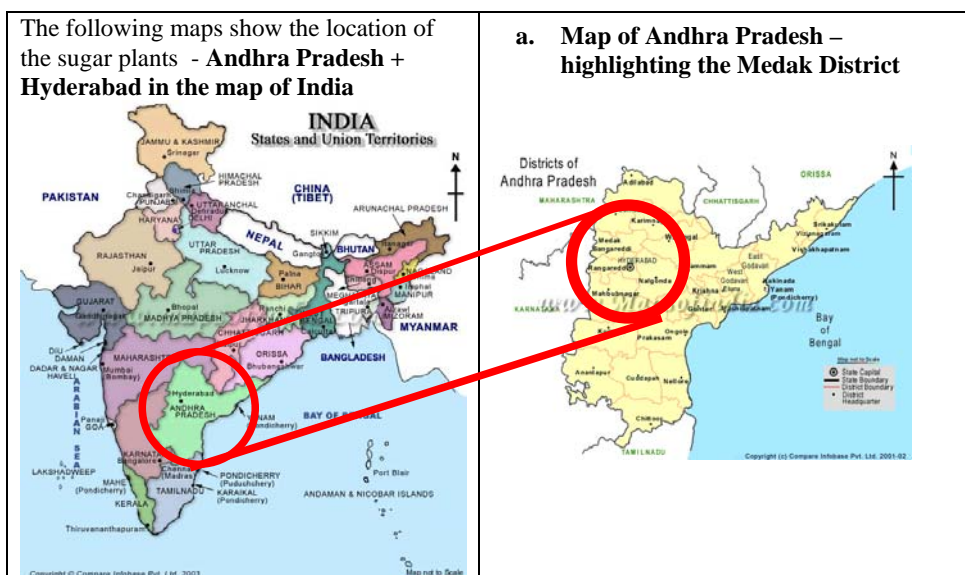


Figure 1

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

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Type I – Renewable Energy Projects

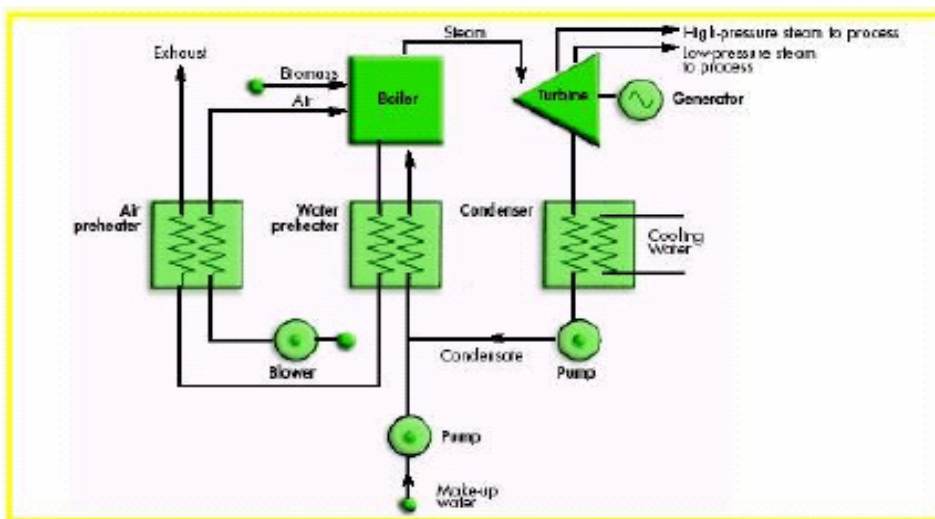
I D – Renewable Electricity Generation for a grid

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 backpressure 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/cm² and 480°C 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 necessary evidences will be provided to the validator) and the net thermal energy output from the boiler is less than 45 MWth.

The net export to the grid during the season⁴ 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
Temperature	380°C	480°C
Pressure	32 Kg cm ² (ATA)	67 Kg cm ²
Numbers	2	1

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.



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 bagasse 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.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

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As of 31 March 2004, India had generation capacity of 112,058MW. Thermal plants, with 70% of total generation capacity, account for the bulk. The break-up of the balance was hydroelectric (26%), nuclear (2.4%) and wind (1.4%). Captive generation capacity was 19,061MW in addition to this capacity.

Power generators are either central government owned like NTPC, selling to one or more states/other bulk consumers such as railways; state government owned, selling only to the home state; private sector (IPPs), selling to one or more states; and captive power, which sells part of its surplus power to the state grid.

Central and state utilities are currently promised an ROE of 14% by the respective buyer. Earlier, IPPs were promised a 16% ROE or a fixed tariff if the contract is by way of a competitive bidding. Captive generators with surplus power are usually offered compensation only on their variable cost (no recovery of fixed costs) with or without a marginal profit element. There is, however, a proposal to provide incentives to bulk surplus generators by compensating them for part of their fixed charges, especially during peak demand requirements. This is however, yet to be finalized and as such there is a lack of clarity o the issue.

The power industry in India has been characterized by supply shortages. In FY04, demand for electricity exceeded supply by an estimated 7.1% in terms of total requirements and 11.2% in terms of peak demand



requirements. Power generation capacity in India has increased substantially in recent years. However, it has not kept pace with the growth in demand. The total demand for electricity in FY04 was 559bn units vs. supply of 519bn units, resulting in shortfall of 40bn units (i.e. 7.1% of total demand).

The South Indian Regional Grid comprises of the Southern Indian states including Andhra Pradesh. By dispatching renewable energy to the South Indian Grid, the project alters the baseline scenario (however marginal the impact may be). The baseline scenario being that electricity would, in the absence of the project activity continue to be generated by the operation of grid connected power plants and by the addition of new generation sources, perhaps in a similar fuel / emission mix as the existing composition of the grid.

As the Andhra Pradesh electricity grid is connected to the South Indian Regional grid and almost all the grid connected generation units are must run projects (the grid facing a demand suppressed scenario) the Carbon Emission Factor of the south Indian Regional Grid, as computed by the Ministry of Non-conventional Energy Sources, Government of India (when applied to the electricity generated and delivered by the project) would provide an accurate estimation of the reduction of anthropogenic green house gases (GHG) that can reasonably expected on account of the said project activity. The weighted average emissions of the South Indian Regional Grid have been computed to be 937.41 t CO₂eq / GWh of electricity produced.

In addition to the above, the project has resulted in the reduction of GHGs as under:

Reduction of Methane Emission:

The project has resulted in a direct reduction of the quantity of Methane emitted on account of

- (1) Open air burning of bagasse
- (2) Surplus mill generated bagasse being dumped in open uncontrolled landfills, in absence of a market for the same (year 2000-01).

However, as reduction in emissions of GHG in both (1) & (2) above cannot be accurately estimated, a conscious decision has been taken NOT to consider the GHG emissions reduction on account of the same for the computation of the annual volume of Carbon Credits. This has been done to ensure the highest levels of environmental integrity and to ensure that the results achieved are conservative.

Bagasse is a fibrous biomass, generated as a by-product from processing sugarcane. It accounts for almost 25% of the weight of fresh cane and approximately one third of its energy content. In most Indian sugar mills, burning bagasse for generation of process heat and power production is an established practice, albeit very inefficiently and under very different equipment configuration. The plants typically installed are of very low-pressure configuration, primarily to cater to the in house power requirements. Export of power to the grid is not a standard business practice.

As per the resolution on National Electricity Policy and Mega Power policy drafted by the Ministry of power and the Planning commission in the year 2003⁵, the policies well supports Fossil fuel Based power generation than renewable energy based power generation. Hence it is clearly evident that in the absence of the project activity the emission reduction would not occur in cohesion with the policy guidelines.

⁵ www.powermin.nic.in



The fact that of the 507 sugar mills in India, with a total potential for bagasse co-generation in excess of 3,500 MW⁶, only 38 mills have co-generation facility (installed capacity a mere 226 MW⁷. Of these 38 mills, only 12 are of high-pressure configuration similar to that of the proposed project This is a clear and concrete indication of the fact that setting up high pressure boiler configuration and generating power for export to the grid is NOT a BAU practice in the Indian sugar industry. This further highlights the fact that:

1. There are significant barriers to implementing high-pressure configuration co-generation / biomass power plants in the country.
2. High-pressure bagasse co-generation in Indian sugar mills is NOT a standard business practice. This is further substantiated by the fact that of the 507 sugar mills in India, only 38 have cogeneration systems of which only 12 are of a high pressure configuration i.e. less than 7% of the mills in the country operate with the same configuration.

The above would confirm the fact that owing to historical and other operating / economic reasons, co-generation projects with high pressure configurations, for export of power to the regional Grid is NOT a standard practice and thus NOT a Business As Usual scenario. Factors contributing to this are the perceived and actual risks associated with such capital-intensive projects namely:

- There are NO regulatory/ other regulations requiring sugar mills to set up bagasse / biomass based power plants.
- Uncertainty with respect to the Power Purchase Agreement (PPA) & poor fiscal health of the state electricity boards, the principal customers is coupled with the uncertainty in tariff and low power purchase price offered. The power purchase agreement signed was for a period of 4 years upto 31st March 2004.
- Availability of Raw material / fuel: The availability of biomass fuel (primarily bagasse) is largely dependent on the monsoons and is thus by nature cyclical. The recent dramatic changes in the climatic patterns + draughts has further compounded a already dire situation. This is a significant risk factor and typically, the sugar (and thus bagasse) producing season in Andhra Pradesh is limited to 160 - 180 days per annum, which in effect translates to a maximum PLF of ~ 40 - 55% on a calendar year.
- Credit worthiness of the state electricity boards, the primary customers- resulting in most financial institutions being unwilling to finance such projects.
- High Wheeling & distribution tariffs: Even though the Electricity Act 2003 has very forward-looking and progressive ideas and stipulations, their compliance by the various electricity boards is dismal. This is largely on account of the fact that the electricity boards do not want to loose the large industrial customers, as they are ones subsidising all the sops offered to the 'poor farmers' by the political class. With a view to discourage a mass exodus to privately owned power generators, the State electricity boards, who control the grid has adopted a policy of levying high wheeling & distributing surcharge. Making direct 3rd party power sale a very complicated process.
- Poor financial condition of Sugar Mills: Typically most sugar mills in India have been going thru very poor financial condition. Skewed policy making by the central government coupled with a policy tilted in favour of the cane growers and a strict supply control regime has resulted in the

⁶ Source: <http://www.mnes.nic.in/business%20oppertunity/pgtbp.htm>

⁷ http://www.mnes.nic.in/annualreport/2001_2002_English/ch5_pg11.htm



market being completely distorted. This has severely eroded the ability of most players (barring a few large companies) to undertake significant capital-intensive projects. Access to Carbon credits linked financing would help in achieving the risk return balance and making the projects attractive enough to attract the desired level of investments. (Data on the loss making mills)

Owing to the above, it can be concluded that bagasse based power generation projects (with a high pressure configuration) is NOT the business as usual scenario in the Indian sugar industry. Thus in the absence of the proposed project, the said emissions reduction would not have occurred.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

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The total emissions reduction for the first 7 years of the project is expected to be as under:

Years	Annual estimation of emission reductions in tonnes of CO₂ e
2003	50,328
2004	33,983 ⁸
2005	51,111
2006	51,111
2007	51,111
2008	51,111
2009	51,111
Total estimated reductions	339,865
	For the first crediting period
Total number of crediting years	21 (3 x 7)
Annual average over the crediting period of estimated reductions (tones of CO₂ e)	48,552

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

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

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

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

⁸ The Andhra pradesh state has gone for a severe drought in that particular period and also shortage of cane availability for the milling process.



“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 an application to register another small-scale CDM project activity:

- With the same project participants
- In the same project category and technology/measure; and
- Registered within the previous 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 a baseline methodology:****B.1. Title and reference of the approved baseline methodology applied to the small-scale project activity:**

>> Type I – Renewable Energy Projects
ID - Renewable electricity generation for a grid

B.2 Project category applicable to the small-scale project activity:

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The project produces renewable energy from the combustion of bagasse. For cogeneration plants the limits set on the rating of the primary boiler in section ID is 45MWthermal as per Appendix B of the simplified modalities and procedures for small-scale CDM project activities. 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.

With regard to Appendix B of the Simplified Baseline and Monitoring Methodologies the project does not fall under point 28 and therefore there is a choice of two approaches left, 29 (a) or (b). We have chosen approach (a) as the baseline for this project:

“(a) The average of the “approximate operating margin” and “build margin”,

Where:

(i) The “approximate operating margin” is the weighted average emissions (in kgCO₂equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

(ii) The “build margin” is the weighted average emissions (in kgCO₂equ/kWh) of recent capacity additions to the system, defined as the lower of most recent 20% of plants built or the 5 most recent plants;”

In the absence of the project activity, it is likely that only economically attractive courses of action will be implemented for grid electricity generation, which includes continued use of existing generation plants and significant expansion of existing capacity with new plants. Hence, the project participants selected approach 29(a) as most suitable for the project activity.

The present project meets all of the above criteria. Therefore, the methodology is applicable to the project activity.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

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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. ;
 - ❑ Fuel Ethanol blending was being made mandatory and the Company could quite easily have opted for setting up a fuel ethanol project, with lower project off take risk and more credible customers;

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:

1. 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;
2. Set up a distillery for manufacturing fuel ethanol: This option was seriously considered and had found favour, but was ultimately rejected as it would not have been eligible to generate CERs, as the then government was in the process of making it mandatory for fuel companies to blend 5% fuel ethanol with petrol;



3. Set up a new co-generation power project based on a high pressure boiler configuration and develop the ~~project~~ project not 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 are 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 manpower 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 additional resources and would thus not be affected by the barriers outlined above.
- ❑ Set up a distillery for manufacturing fuel ethanol: This option too would not be impacted by any of the barriers outlined above as it (i) leverages the existing skills and operational expertise of the management; (ii) On account of the Government of India's clear intention to make in mandatory to blend atleast 5% Fuel Ethanol with motor spirit, the market demand was established, with the large oil companies being the primary customers. The Oil companies are relatively good paymasters and unlike the power project, fuel ethanol can be stored and exported, should there be issues with the domestic market.

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 (Bagasse) 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 in 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 co-generation in excess of 3,500 MW⁹, only 38 mills have co-generation facility (installed capacity a mere 226 MW¹⁰). 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 from 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.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

>>

The project boundary shall consist of the power generation plant as well as the South Indian Regional grid, to which power is being exported.

B.5. Details of the baseline and its development:

>>

Date of completion of the baseline study : 21/06/2005

Name of the entity conducting the baseline study:

Ganpati sugar Industries Limited
Name of the Person: Mr. P.M Nair, Director

⁹ Source: <http://www.mnes.nic.in/business%20oppertunity/pgtbp.htm>

¹⁰ http://www.mnes.nic.in/annualreport/2001_2002_English/ch5_pg11.htm



The project activity is generation of electricity for a grid system, which is also fed by other fossil fuel, and non-fossil fuel based generation units. Hence the applicable baseline methodology for the proposed project activity is as per Clause 29 of indicative simplified baseline and monitoring methodologies, which states that the baseline is the kWh produced by the plant multiplied by an emission coefficient (measured in KgCO₂/kWh) calculated in a transparent and conservative manner. The baseline is estimated using the method specified under 29.a. i.e. the average of the “approximate operating margin” and “build margin”. The detailed baseline emissions calculations are provided separately in Annex 3.

Baseline Emission Factor: 937.41 tCO₂e/GWh

**SECTION C. Duration of the project activity / Crediting period:****C.1. Duration of the small-scale project activity:**

>>

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

>>

29/04/2001

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

>>21 years

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

>> The project activity will use a renewable crediting period

C.2.1. Renewable crediting period:

>>

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

>>

[01/01/2003 \(Synchronisation to the grid\)](#)**C.2.1.2. Length of the first crediting period:**

>>7 years

C.2.2. Fixed crediting period:

>> Not applicable

C.2.2.1. Starting date:

>>Not applicable

C.2.2.2. Length:

>>Not applicable

**SECTION D. Application of a monitoring methodology and plan:**

>>

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

>>

Type I – Renewable Energy Projects

I D - Renewable electricity generation for a grid

“Monitoring shall consist of metering the electricity generated by the renewable technology.”

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

>>

The expansion of the bagasse cogeneration unit at the GSIL factory will provide electricity to the annexed sugar refinery and to the Andhra Pradesh grid. This electricity will displace existing grid generation capacity and future planned grid capacity additions. The main variable in determining the volume of emission reductions is the power exports to the sugar refinery and the grid.

Exports of power are currently monitored by automated sensors (current transformers) installed at the 33kv step up plant for exports to the grid and sugar refinery. Monthly readings from the sensors at the step up plant are taken jointly by APCPDCL and the factory and form the basis for payments of power sold (in line with the current recording of these data the figures will be recorded as monthly totals, net of imports). Monthly readings of electricity supplied to the refinery are recorded by the factory staff and used for internal transfer pricing.

The length of the season is a requirement in the calculation of the eligible exports. The season is currently recorded as part of the existing management information systems. This is normally recorded in days but will be converted to hours by multiplying the season length in days by twenty-four. The mass of fossil fuel will be monitored through purchase receipts and may be crosschecked against financial statements. Quality assurance for these two sets of data is high due to the commercial importance associated with power exports and the start and end dates of the crushing season are crucial to the most important dates in the operation of the factory.

**D.3 Data to be monitored:**

>>

D.3.1 Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
1	Electricity supplied to the grid	Plant Records	MWh	M	Hourly	100%	Electronic/paper	Electricity supplied to the grid from the project.
2	Electricity consumed for captive power purposes	Plant Records	MWh	M	Hourly	100%	Electronic/Paper	Electricity supplied to the refinery plant from the project.
3	CEF of the grid	CEA Annual Generation Report & Local Statistics Available	tCO ₂ e /GWh	c	<u>At the time of validation</u>	100%	electronic	Calculated as the weighted sum of OM and BM Emission <u>Factor. As the emission co-efficient for the baseline is calculated ex-ante.</u>
4	CEF Operating Margin of the grid	CEA Annual Generation Report & Local Statistics Available	tCO ₂ e /GWh	c	<u>At the time of validation</u>	100%	electronic	Calculated based on Simple OM CEF as indicated in the baseline methodology <u>As the emission co-efficient for the baseline is calculated ex-ante.</u>
5	CEF Build Margin of the grid	CEA Annual Generation Report & Local Statistics Available	tCO ₂ e /GWh	c	<u>At the time of validation</u>	100%	electronic	Calculated based on Simple BM CEF as indicated in the baseline methodology <u>As the emission co-efficient for the baseline is calculated ex-ante.</u>
6	Fossil fuel usage	Plant records	tons	M	daily	100%	Electronic/paper	IGP registers



D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1	Low	<i>This will be cross checked with the bills raised by the company as well as the payment details by the grid operator. The actual quantity of electricity delivered to the Grid will be used for the CER computation purposes. Meters will undergo maintenance/calibration subject to appropriate industry standards. The accuracy of the meter readings will be verified by receipts issued by the purchasing power company.</i>
2	Low	The data will be archived from the internal generation data and consumption for the captive purposes. Meters will undergo maintenance/calibration subject to appropriate industry standards. The accuracy of the meter readings will be verified by receipts issued by the purchasing power company.
3	Low	This involves the use of official data released by the power generating company. Quality control of this data is beyond the control of the project operators. However, the data, if considered unreasonable, may be supplanted by more accurate data according to methods verified by the DOE.
4	Low	This involves the use of official data released by the power generating company. Quality control of this data is beyond the control of the project operators. However, the data, if considered unreasonable, may be supplanted by more accurate data according to methods verified by the DOE.
5	Low	This involves the use of official data released by the power generating company. Quality control of this data is beyond the control of the project operators. However, the data, if considered unreasonable, may be supplanted by more accurate data according to methods verified by the DOE.
6	Low	<i>This will be crosschecked with the bills raised by the company as well as the payment details by the supplier. The actual quantity of coal utilized would be recorded and reduced from the CER generateds. Weighing machines will undergo maintenance/calibration subject to appropriate industry standards. The accuracy of the meter readings will be verified by calibration certificates</i>

The project employs electronic based high accuracy monitoring and control equipment that will measure, record, report, monitor and control of various key parameters like generation by the project, auxiliary consumption and net energy exported to the grid. These monitoring and controls will be the part of the Distributed Control System (DCS) of the entire plant. Necessary standby meters or check meters will be installed, to operate in standby mode when the main meters are not working. All meters will be calibrated and sealed as per the industry practices at regular intervals. Hence, high quality is ensured with the above parameters. Sales records will be used and kept for checking consistency of the recorded data.

Data for other parameters such as fuel consumption, generation by plant parameters etc. will be obtained from the official statistics published by the Central Electricity Authority and Ministry of Non-



conventional Energy Sources, Govt. of India. Hence, quality control is not under the control of the project participants. However, the obtained data will be properly monitored, recorded and kept for verification.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

The GSIL's power division will carry out Monitoring and recording of electricity exports. Comprehensive systems are in place to accurately measure the electricity generated and exported to the grid on a continuous basis. This data will be signed off by the plant manager and then crosschecked against the payment records / details provided by the Grid operator.

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 General Manager of the power division to ensure that the details submitted are accurate.

D.6. Name of person/entity determining the monitoring methodology:

>>

Ganpati sugar Industries Limited
Name of the Person: Mr. P.M Nair, Director

**SECTION E.: Estimation of GHG emissions by sources:****E.1. Formulae used:**

>>

E.1.1 Selected formulae as provided in appendix B:

>>

No formula is used. Emissions by sources are zero since Baggase based cogeneration power is a zero CO2 neutral source of energy

E.1.2 Description of formulae when not provided in appendix B:

>>

Calculation of the project GHG emissions reductions applies a weighted average emissions factor for all the thermal plants that are operational on the Southern grid of India as of Mar 2005. Appendix B of the simplified M&P for CDM small-scale project activities does not provide specific formulae for the baseline for project Category I.D paragraph 7. The detailed description is provided in section E.1.2.4

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

Not applicable because the entire power will be generated through mill generated bagasse. However in case coal is being utilized later, the CERs generated would be reduced as per the following computation:

$$PE_{CO_2, y} = FF_y * COEF_{CO_2}$$

where:

FF_y is the quantity of fossil fuel type combusted in the biomass power plant during the year y, and $COEF_{CO_2}$ is the CO2 emission factor of the fuel type.

$$FF_y = BIO * Coal \% * CV_{Biomass} / CV_{Coal}$$

Where,

- BIO is the amount of biomass consumed in each year of the crediting period, in tons.
- $CV_{Biomass}$ is the Calorific value of biomass, in kcal/kg.
- CV_{Coal} is the calorific Value of the Coal, in kcal/kg.
- Coal % is the percentage of coal used in the project, in tons/year

CO2 emissions from combustion of coal are calculated as follows:

$$PE_{CO_2, y} = FF_y * COEF_{CO_2}$$

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>>

Despite the fact that the project activity has resulted in the reduction of emission of Methane (due to the surplus bagasse stored) as well as addition CO2 sequestered due the energy plantation, these have NOT been considered to enhance the environmental integrity of the proposed project Emissions reduction claim and to off-set minor leakages that may occur.

**E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:**

>>

Project emissions are zero

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

The project derives and calculates the baseline emission co-efficient on ex-ante basis and the actual electricity produced is metered ex-post.

Step1: Calculation of Operating Margin Emission Factor for the region based on Simple OM:

$$EF_{OM, simple, y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}}$$

where

$F_{i,j,y}$ Is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y .
 j Refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports from the grid.

$COEF_{i,j,y}$ Is the CO₂ emission coefficient of fuel i (tCO₂ / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y .

$GEN_{j,y}$ Is the electricity (GWh) delivered to the grid by source j .

$$COEF = NCV_i \cdot EF_{CO_2,i} \cdot OXID_i$$

where

NCV_i Is the net calorific value (energy content) per mass or volume unit of a fuel i .

$EF_{CO_2,i}$ Is the CO₂ emission factor per unit of energy of the fuel i .

$OXID_i$ Is the oxidation factor of the fuel (see page 1.29 in the 1996 Revised IPCC Guidelines for default values).

Step2: Calculation of Build Margin Emission Factor for the region (ex-ante):

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_m GEN_{m,y}}$$

where

$F_{i,m,y}$, $COEF_{i,m}$ Are analogous to the variables described for the simple OM method above for plants m .
and $GEN_{m,y}$



Step 3: Calculation of Electricity Baseline Emission Factor:

$$EF_{electricity,y} = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

where the weights w_{OM} and w_{BM} , by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO₂/MWh.

Step 4: Calculation of Baseline Emissions due to displacement of Electricity

$$BE_{electricity,y} = EF_{electricity,y} \cdot EG_y$$

where

$BE_{electricity,y}$ Are the baseline emissions due to displacement of electricity during the year y in tons of CO₂.

EG_y Is the net quantity of electricity generated in the bagasse-based cogeneration plant due to the project activity during the year y in GWh.

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

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>

Emission reductions from the project activity are **339,865**tCO₂ throughout the first crediting period

E.2 Table providing values obtained when applying formulae above:

>>

Year	2003	2004	2005	2006	2007	2008	2009
Baseline emissions, E.1.2.4 , tCO ₂	50,328	33,983	51,111	51,111	51,111	51,111	51,111
Project emissions, E.1.2.3 , tCO ₂	0	0	0	0	0	0	0
Emissions Reductions, E.1.2.4 – E.1.2.3 , tCO ₂	50,328	33,983	51,111	51,111	51,111	51,111	51,111

**SECTION F.: Environmental impacts:****F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:**

>>

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 G. Stakeholders' comments:**G.1. Brief description of how comments by local stakeholders have been invited and compiled:**

>>

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.

Copies of the letter sent and received are annexed

G.2. Summary of the 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.

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

>>

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

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY****The below entity is the project proponent**

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
Postfix/ZIP:	500 034
Country:	India
Telephone:	91-40-23355212, 23355213, 23355214
FAX:	91-40-23350959
E-Mail:	ganpatihyd@satyam.net.in
URL:	
Represented by:	
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

Annex 2**INFORMATION REGARDING PUBLIC FUNDING**

There is no funding from Annex- I parties

**Annex 3****BASELINE INFORMATION**

Step 1: Calculation of Operating Margin Emission Factor (EF_{OM,y}) based on Simple OM method

- The “approximate operating margin” is the weighted average emissions (in t CO₂equ / GWh) of all generating sources serving the system (in this case the South Indian Regional Grid)), excluding hydro, geo thermal, wind, low cost biomass, nuclear and solar generation;

Power station	Owner	Installed Capacity	Fuel	Generation GWh	Emission Factor IPCC	Emissions tCO ₂ e	Year of commissioning
				2003	tCO ₂ /GWh	2003	
Karnataka							
Raichur (unit 7)	KPCL	210	Coal 3E	1470	1080	1586892	2002
Raichur (units 1 to 6)	KPCL	1260	Coal 3E	8820	1080	9521353	1996
Tanir Bavi	GMR	220	Naptha	1280	638	817142	2001
Bellary	Pvt	25.2	Diesel	64	638	40857	
Torangallu IMP	Jindal	260	Gas	872	1080	941340	
Belgaum	Tata	81.3	Diesel	355	638	226629	
Yelahanka	VVNL	120	Diesel	715	638	456451	1993
Karnataka Hydro			Hydro	4423	0	0	
Kaiga	NPC	440	Nuclear	3317	0	0	2000
Andhra Pradesh							
K Gudam	APGENCO	1170	Coal 3E	8729	1327	11587327	1998
Vijayawada	APGENCO	1260	Coal 3E	10288	1044	10735883	1995
Ramagundam	APGENCO	62.5	Coal 3E	390	1281	499509	1971
Nellore	APGENCO	30	Coal 3E	147	1487	218619	1965
Royal Seema	APGENCO	420	Coal 3E	3488	1053	3671571	1995
Vijeshwaran	APGPC	272.3	Gas	2031	484	982059	
Peddapuram CCGT	REL	220	Gas	850	484	411005	2002
Jegurupadu GT	GVK	235.4	Gas	1583	484	765436	
Kondapalli	Kondapalli Th	350	Gas	2477	484	1197716	
LVS Power	LVS Power	36.8	Diesel	2	638	1277	2001
Godavari GT	Spectrum	208	Gas	1250	484	604419	
R'gundam STPS	NTPC	2100	Coal	16839	1053	17731618	1989
Simhadri	NTPC	1000	Coal	4974	1053	5237667	2002
AP Hydro		3643.7	Hydro	3665	0	0	
Kerala							
Brahamapuram DG	KSEB	106.5	Diesel	267	638	170451	
Kozikode DG	KSEB	128.8	Diesel	385	638	245781	1999
Cochin CCGT	REL	174	NG	305	484	147478	1999
Kasargode	RPG	21.9	Diesel	148	638	94482	
Kayamkulam	NTPC	350	NG	2127	484	1028479	1999
Kerala Hydro		1828.5	Hydro	4860	0	0	
TamilNadu							



Ennore	TNEB	450	Coal 3E	1747	1694	2958841	1970
Tutikorin	TNEB	1050	Coal 9T	8187	1063	8703408	1979
Mettur	TNEB	840	Coal 9T	6739	1063	7164073	1987
North Chennai	TNEB	630	Coal 3E	4405	1053	4638574	1994
Basin Bridge	TNEB	120	NG	276	484	133456	1996
Nariman GT	TNEB	10	NG	0	484	0	
Valuthur GT	TNEB	95	NG	104	484	50288	2003
Kovilakalappal	TNEB	107	NG	726	484	351046	
Samayanallur	Madurai P	106	Diesel	589	638	376013	2001
Neyveli	Pvt	250	Lignite	406	1225	497544	2002
P Nallur CCGT	PPNPG	330.5	NG	2169	484	1048787	2001
Samalpatti DG	Samalpatti	105.7	Diesel	623	638	397718	2001
Basin Bridge DG	Vasavi	200	Diesel	1209	638	771816	
Neyveli STI	NLC Th	600	Lignite	4421	1225	5417835	1970
Neyveli STII	NLC Th	1470	Lignite	10495	1225	12861385	1993
Neyveli FST Ext	NLC Th	420	Lignite	89	1225	109067	2003
TN Hydro		1990.5	Hydro	2729	0	0	
MAPP,kalpakam	NPC	340	Nuclear	1073	0	0	1986
Wind	Pvt	1361.6	Wind	1305	0	0	
Pondichery							
Karaikal GT	PPCL	32.5	Gas	265	484	128137	1999
Total				133678		114529427	

Fuel	Generation GWh	generation %
	2003	2003
Thermal	112306	84.0
Hydro	15677	11.7
Nuclear	4390	3.3
other RE	1305	1.0
Total	133678	100
20% of the Total	26735.6	

Operating Margin Calculations of Southern Region

$\sum F_{i,j,y} \times COEF_{i,j}$	$\sum GEN_{i,j}$	$\sum EFOM_{y}$
114529426.8	112306	1019.79793



Step 2: Calculation of Build Margin Emission Factor ($EF_{BM,y}$) based on Option 1 (ex-ante method)

Power station	Owner	Fuel	Generation GWh	Cummulative Generation (GWh)	Emission Factor IPCC	Emissions tCO ₂ e	Year of commissioning
			2003	2003	tCO ₂ /GWh	2003	
Valuthur GT	TNEB	NG	104	104	484	50288	2003
Neyveli FST Ext	NLC Th	Lignite	89	193	1225	109067	2003
Raichur (unit 7)	KPCL	Coal 3E	1470	1663	1080	1586892	2002
Peddapuram CCGT	REL	Gas	850	2513	484	411005	2002
Simhadri	NTPC	Coal	4974	7487	1053	5237667	2002
Neyveli	Pvt	Lignite	406	7893	1225	497544	2002
Tanir Bavi	GMR	Naptha	1280	9173	638	817142	2001
LVS Power	LVS Power	Diesel	2	9175	638	1277	2001
Samayanallur	Madurai P	Diesel	589	9764	638	376013	2001
P Nallur CCGT	PPNPG	NG	2169	11933	484	1048787	2001
Samalpatti DG	Samalpatti	Diesel	623	12556	638	397718	2001
Kaiga	NPC	Nuclear	3317	15873	0	0	2000
Kozikode DG	KSEB	Diesel	385	16258	638	245781	1999
Cochin CCGT	REL	NG	305	16563	484	147478	1999
Kayamkulam	NTPC	NG	2127	18690	484	1028479	1999
Karaikal GT	PPCL	Gas	265	18955	484	128137	1999
K_Gudam	APGENCO	Coal 3E	8729	27684	1327	11587327	1998
Raichur (units 1 to 6)	KPCL	Coal 3E	8820	36504	1080	9521353	1996
Basin Bridge	TNEB	NG	276	36780	484	133456	1996
Vijayawada	APGENCO	Coal 3E	10288	47068	1044	10735883	1995



Step 3: Calculation of Baseline Emission Factor E_{fy}, as the weighted average of Operating Margin Emission Factor and Build Margin Emission Factor:

A	20% of state grid	26736
B	Plants meeting 20%	27684
C	Last Five Plants Total	7487
$\sum F_{i,j,y} \times \text{COEF}_{i,j}$ for C(t CO ₂)		23670601
$\sum \text{EF}_{\text{BM},y}$ (tCO ₂ /GWh)		855.03

Average $\sum \text{EF}_{\text{BM},y}$	855.03
Average $\sum \text{EF}_{\text{OM},y}$	1019.80

Southern region emission factor

$\sum \text{EF}_y$ (Avg of OM & BM)	937.41	(tCO₂/GWh)
-------------------------------------	---------------	------------------------------



Annex 4

MONITORING PLAN

The Monitoring provides a range of data measurement, estimation and collection options/techniques in each case indicating 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 GSIL 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, greenhouse gas (GHG) emission reductions.

The project revenue is based on the units exported as measured by power meters at plant and check meters at the high-tension substation of the APTRANSCO. The monitoring and verification system mainly comprise of these meters as far as power export is concerned. The export of electricity will be through invoices to APTRANSCO. The bagasse input is also to be monitored. The measurement of the quantity of bagasse used will produce evidence that the energy is being generated with zero net CO₂ emissions.

The GSIL project activity has employed the latest state of art monitoring and control equipment that measure, record, report, monitor and control various key parameters. Parameters monitored are the quantity and quality of bagasse fuel used, total power generated, power exported to the grid. All monitoring and control functions will be done as per the internally accepted standards and norms of GSIL.

The instrumentation system of the GSIL project activity will mostly comprise microprocessor – based instruments of reputed make with desired level of accuracy. All instruments will be calibrated so that the accuracy of measurement can be ensured all the time.

GHG SOURCES

1. Project Emissions from the fossil fuel usage

Not applicable because the entire power will be generated through mill generated bagasse. However in case coal is being utilized later, the CERs generated would be reduced from the emission reductions annually.

2. Baseline Emissions from the grid electricity generation

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. Therefore the net electricity (after meeting the auxiliary and captive needs) exported to the grid multiplied by the baseline emission factor gives the baseline emission reductions.

MONITORING APPROACH

The general monitoring principles are based on:

1. Frequency
2. Reliability
3. Registration and reporting



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 continuous basis by both APTRANSCO and the project developer through DCS.

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. Therefore the system ensures the final generation is highly reliable.

Registration and reporting

Registration of date is on-line in the control cabin through a microprocessor. However, hourly data logging will be there in addition to software memory. Daily, weekly and 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 other major factor, which needs to ensured and monitored, is the use of bagasse fuel for power generation.

OPERATIONAL PARAMETERS OF THE GSIL PROJECT ACTIVITY

Total power generated

The total power generated along with the power consumed for auxiliaries, sugar plant and the power exported to the grid will be measured in the plant premises to the best accuracy and will be recorded, monitored on a continuous basis through DCS.

Power exported to the grid

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~~The measurement will be recorded and monitored on a continuous basis by both APTRANSCO and the project developer through DCS.

Power generation at plant premises	<u>MWh</u>	
Power consumption for captive purposes	<u>MWh</u>	
Aux. Consumption at plant premises	<u>MWh</u>	
Net Energy export	<u>MWh</u>	
Energy reading at APSEB Sub-	<u>MWh</u>	



station		
---------	--	--

Efficiency of the cogeneration project activity, major equipments like boiler & STG

The inlet and outlet steam parameters of the boiler will be measured and monitored along with the parameters of fuel and feed water. Quantity of the steam to the turbine will be monitored through DCS.

Based on the measured input and output parameters system efficiency of boiler and STG will be calculated and monitored by DCS.

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

VERIFICATION

The performance of the bagasse based power project leads to CO₂ emission reductions. In other words, the longer the cogeneration power plant runs and exports power to the grid more would be the emission reductions. The project control system comprises a state of the art sophisticated control and monitoring system like Distributed Control System which measures, collects the information about various process parameters, records, monitors and controls on a continuous basis. Fully functional management information systems built in DCS so that accessing and verification of actual data are possible at any point of time. 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 DCS
- Verification of measurement accuracy

Similar to above activities, following major project parameters which affects the emission claims need to be verified, based on the available operating data is as under

- Cane crushing by sugar unit
- Quantity of the bagasse fuel
- Efficiency of project activity
- Total generation of power and captive & auxiliary power requirements
- Power exported to the grid



Internal GHG Audit Plan



Annex 5

Ref.No.GSIL/SRD/2000/1321

Date: 18th April 2000

To

The Sarpanch,
Gram Panchayat,
FASALWADI VILLAGE.

Dear Sir,

We are pleased to inform you that we are seriously considering the option of setting up a modern, state of the art Co-generation Unit at our Mill in Medak.

Details of the project is as under:

	Project Details	
	Old	Phase 1 -- 15 MW
Boiler		
Capacity	35 TPH X 2	75 MTH/1
Temperature	360 ° C	480 ° C
Pressure	32 Kg cm ² (ATA)	67 Kg cm ²
Numbers	2	1
Turbine		
Capacity	3 MW	15 MW
Temperature	360 ° C	480 ° C
Pressure	32 Kg cm ²	
Numbers	2	
Power Generated		
Season	6 MW	15 MW
Off Season	Nil	Nil
Export to Grid		
Season	Nil	10.6 MW
Off Season	Nil	11.00 MW

The advantages of the project would include:

- Use of waste/surplus bagasse in the factory premises.
- Supply of clean and green power to the local grid, thus improving the power supply to the local community.
- The project would also generate additional employment opportunities for the local community, in addition to an investment of almost Rs.50 Crores.

Contd.P.2.....

GANPATI

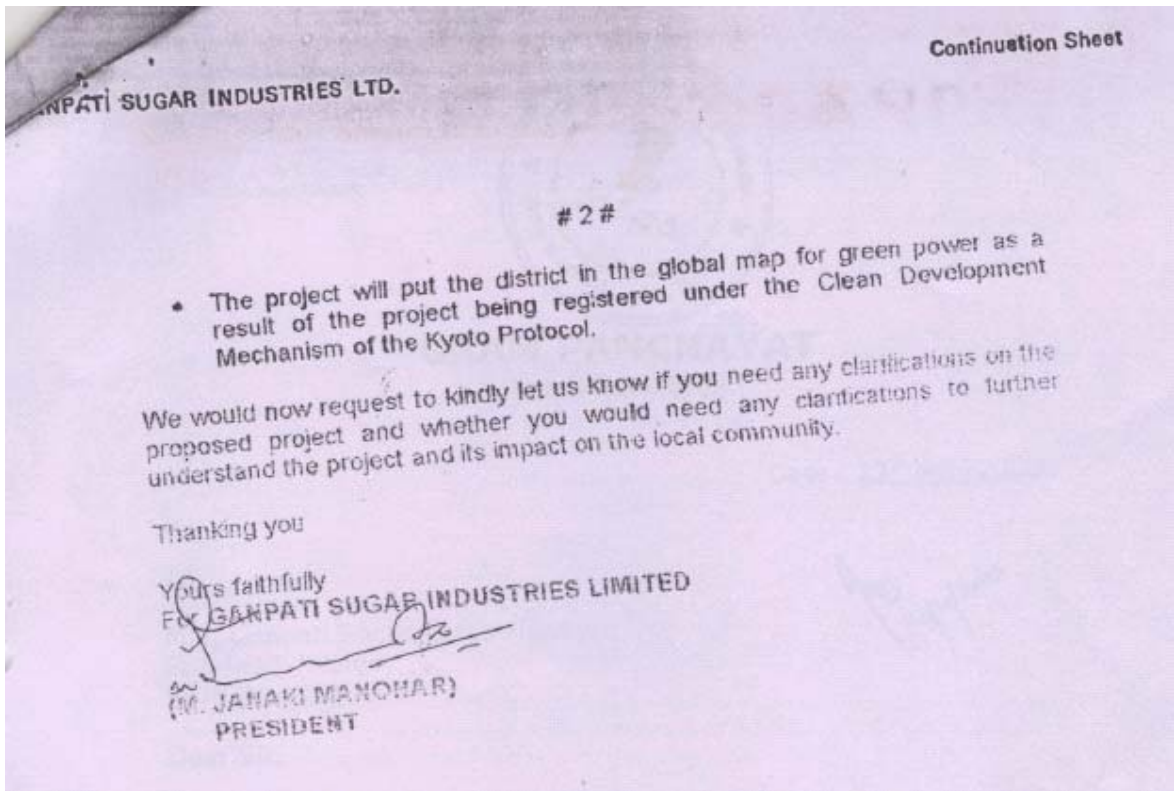
SUGAR INDUSTRIES LIMITED

301, Raghava Ratna Towers,
Chirag Ali Lane, Hyderabad - 500 001.
Phone : 3204235, Tele/Fax : 040-3204236

Regd. & Head Office : 20-B, Abdul Hamid Street, Calcutta - 700 069.

Phones : 248-3203, 7639, 8036, 8037 Telex : 21-7468 EITAIN Gram : Discretion, Fax : 033-2483195

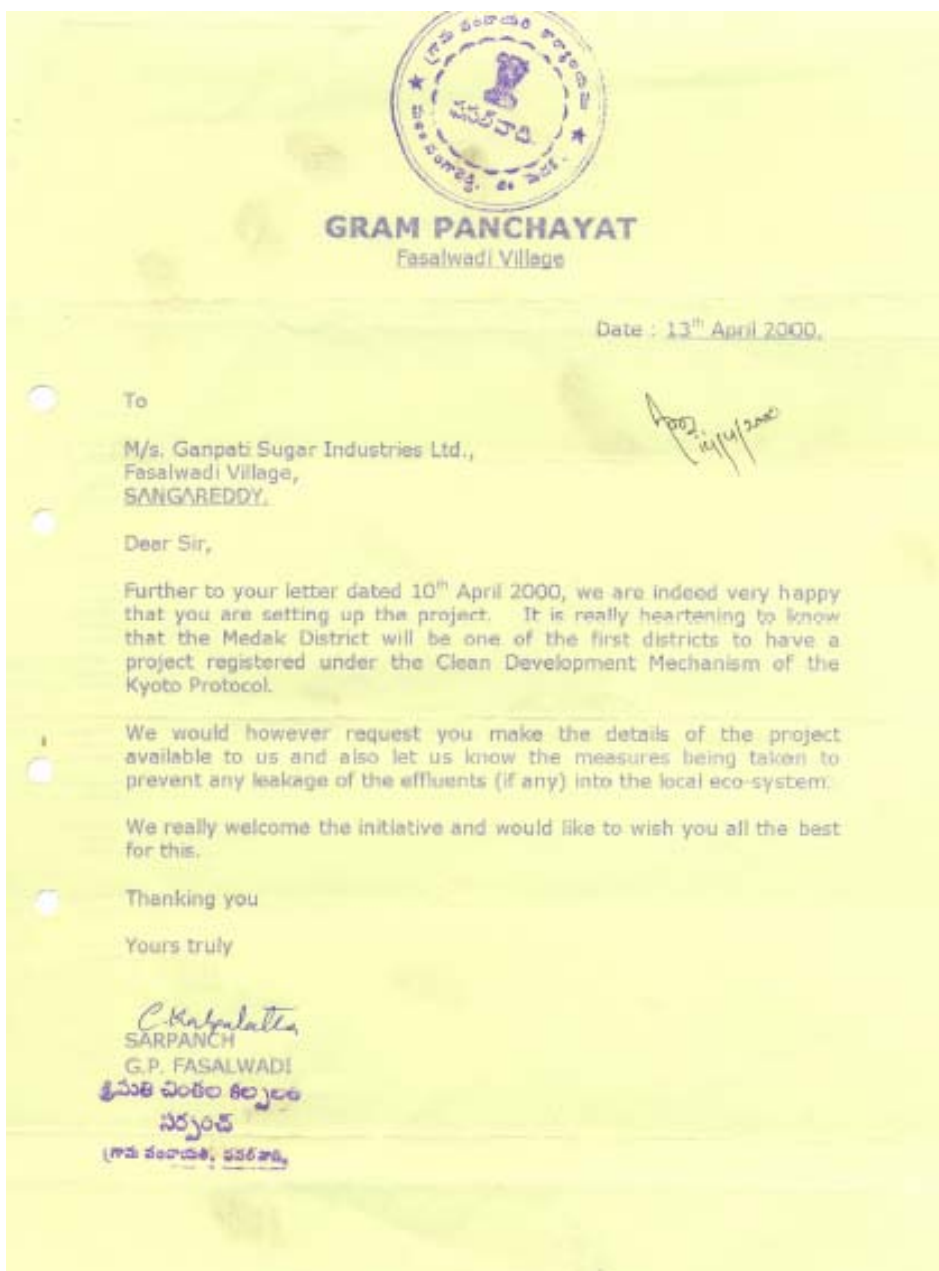
G/LHOB-H/1x100x15/2700/SE



Letter sent by GSIL to the local administrative body (the Panchayat)



Letter of support received from the local administrative body (the Panchayat)





18th Dec., 1999

NOTE SUBMITTED TO THE BOARD

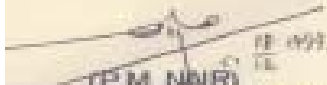
Respected Chairman & Directors,


I would like to appraise the Board regarding the potentiality available in the unit to go for cogen by installing high pressure boiler and high pressure turbines (67 Kg/cm² g). As you are aware, the existing boiler and turbine is of low pressure and low temperature and this can hardly produce 3 MW electricity only. With the feeding of the same bagasse, we may able to generate 5 times power i.e. about 15 MW and also taking the advantage of drawl of 7 KG pressure steam as well as back pressure of 1.5 – 2.5 Kgs steam for process. In this multi drawl, multi stage condensing turbines, we have also got a facility to utilize surplus steam through condensing mode and 4 Kgs. steam is required to give us 1 KWH in an hour.

This proposal I am putting up, as we are already going with the expansion project and procurement of equipments for the same and this can be achieved by ordering the high pressure steam and turbine system instead of low pressure steam turbine and boilers. This low pressure turbine will consume 11 to 12 Kg steam/KWH.

As the technology is new, we are contemplating to get services of M/s. Avant Garde Engineers & Consultants Pvt. Ltd., Chennai as consultants for this project as they are well experienced in these type of installations. However, the cost of the system may be very high and we have to check up the financial viability in detail, so as to make sure that system will strengthen the bottom line of the company by earning some surplus income to the company. This proposal may be cleared so as to enable me to take up the issue with different agencies, such as consultants, pollution control board, Transco, APERC, Electrical Directorate, Govt. of A.P., etc to understand the implications.

For clearance please,


(P.M. NNR)
DIRECTOR (O & P)

Certified to be true Copy
Sangnil Sugar Industries Ltd.

Company Secretary



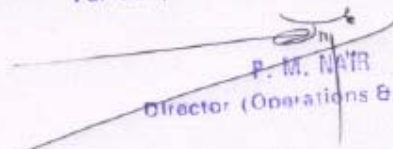
CERTIFIED TRUE COPY OF THE RESOLUTION PASSED BY THE BOARD OF DIRECTORS OF THE COMPANY IN ITS MEETING HELD ON 13TH JUNE 2000 AT ITS REGISTERED OFFICE AT 20 B, ABDUL HAMID STREET, KOLKATA – 700 069 AT 10.30 A.M.

Shri P.M.Nair put up the opinion report of the Statutory Auditors of the Company, M/s A.C. Bhuteria & Co., Chartered Accountants whl were requested to give their opinion on the financials of the details project report prepared by M/s Avant Garde Engineers & Consultants (Pvt.) Ltd., on the proposed 15 MW bagassed based cogeneration power project. The report revealed that the project is not as lucrative as it was projected by M/s Avant Garde and with some variations in the assumptions, considering the interest of equity holders, the project was not viable. The Debt Service Coverage Ratio (DSCR) was only 1.37 and the Project IRR was only 13.28%. Sri S.S.Jain expressed his reservation about the taking up of the project by the company. Sri P.M.Nair further informed that the project will also be eligible for Carbon Emission Credits (CER) and considering the sale of these Carbon Emission Credits, the viability of the Project improves and the company should take up the project. He informed that DSCR considering the CER as per the Auditors' report is 1.37 and IRR improves to 15.32%. The Directors deliberated up on the issue and decided to take up the project and passed the following resolution:

"RESOLVED THAT the company take up the 15 MW Bagasse based power project as the project may yield reasonable returns considering the sale of Carbon Emission credits. It was further resolved that a Project Management Committee be formed to implement and monitor the progress of the project and the said committee will constitute Sri P.M.Nair, Director (O&P), Mr.Janaki Manohar, President and Mr.R.K.Dugar, Vice President (Finance) and Sri P.M.Nair will be the Chairman of the Committee. The Committee under the supervision of Sri P.M.Nair shall take all necessary steps for implementation of the project including statutory clearances and appraise the Board about the status of the progress from time to time.

// CERTIFIED TRUE COPY //

For Ganpati Sugar Industries Limited


P. M. NAIR
Director (Operations & Project)



15 Feb 00 04:10p j

63345309

P:

TRANSOIL INVESTMENTS PTE LTD

Regd Office: 10, Hoe Chiang Road, #18-00 Keppel Towers, Singapore 089315

Tel: 65-62322725 Fax: 65-62322888 HP: 65-98800849

e-mail: transoil@singnet.com.sg

33 224 83195

Fax: (91) 47- 225- 1000

15th February, 2000

Mr. P.M Nair
Director
Ganpali Sugar & Industries Limited
Hyderabad

Fax No. +91 40 3204236

Dear Mr. Nair,

As you are aware, there is an international protocol being negotiated called the Kyoto Protocol, this, inter alia enables renewable energy projects in the developing countries (like India) to generate and sell Carbon Credits.

During our discussions, you had explained the details of your proposed 15 Mw Co-generation project at your sugar mill in Andhra Pradesh. Based on our understanding of the developments regarding the Kyoto Protocol, we believe that the project should be eligible to generate Carbon Credits and we would be keen to enter into formal discussions with you to negotiate a forward contract for acquiring these credits from you.

As you had mentioned, the project should be eligible to generate approximately 38,000 Carbon Credits per annum (10.6 Mw net exports X 24 Hours X 190 days per annum X 0.8 cef).

Subject to the Kyoto Protocol coming into force and the project being implemented (and registered), we would be happy to acquire the said credits from you and prices to be negotiated at a later point in time, once your project is finalised. We believe that we would be in a position to offer prices in the range of US\$ 2.50 to 5.00, depending on the terms of the transaction.

Please note that the above is an INDICATIVE offer only and we will need to negotiate the terms again once the project has been finalised.. We will designate a company for this project.

In case you need any clarifications, we would be happy to provide the same.


For Transoil Investments Pte Ltd

Signatory

Letter

received from Transoil Investments, expressing their interest in acquiring the CERs from the project.




भारत सरकार
पर्यावरण एवं वन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS


F.No.4/22/2005-CCC
26 December 2005


To
Mr. P M Nair,
Director,
Ganapati Sugar Industries Limited,
8-2-438/5, Road No. 4, Banjara Hills,
Hyderabad – 500 034
Fax: 040 23350959

Sub: Host Country Approval to "Ganapati Co-Generation Project" at Medak, Andhra Pradesh by M/s Ganapati Sugar Industries Limited (GSIL) – regarding CDM

Sir,
I am directed to state that the Project Concept Note and Project Design Document "Ganapati Co-Generation Project" at Medak, Andhra Pradesh by M/s Ganapati Sugar Industries Limited was considered by the National CDM Authority in its meeting held on 7 November 2005. The Authority confirms that:

- (i) The Government of India has ratified the Kyoto Protocol in August 2002.
- (ii) This is approval of voluntary participation in the proposed CDM project activity.
- (iii) The project contributes to Sustainable Development in India.


Yours faithfully,

(R. K. Saini)
Director (CC)


पर्यावरण संरक्षण /
पर्यावरण संरक्षण

पर्यावरण भवन, सी.जी.ओ. कॉम्प्लेक्स, लोदी रोड, नई दिल्ली-110003
PARYAVARAN BHAVAN, C.G.O. COMPLEX, LODHI ROAD, NEW DELHI-110003

Host country approval




भारत सरकार
पर्यावरण एवं वन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS

F.No.4/22/2005-CCC

26 December 2005

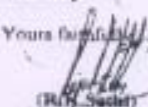
To
Mr. P M Nair,
Director,
Ganapathi Sugar Industries Limited,
8-2-438/5, Road No. 4, Banjara Hills,
Hyderabad – 500 034
Fax: 040 23350959


Sub: Host Country Approval to "Ganapathi Co-Generation Project" at Medak, Andhra Pradesh by M/s Ganapathi Sugar Industries Limited (GSIL) – regarding CDM.

Sir,
Kindly refer to Ministry's letter No 4/22/2005-CCC dated 26 December 2003 conveying Host Country Approval to your CDM project "Ganapathi Co-Generation Project" at Medak, Andhra Pradesh.

Please note that the following conditions shall also be complied with:

- M/s GSIL shall not sell the CERs to any agency/ company/ organization, which purchase the CERs using ODA Funds.
- M/s GSIL shall inform the National CDM Authority regarding all transaction details of CERs including the name and address of the party to which CERs were sold within 30 days of transfer of the CERs.
- M/s GSIL shall furnish expeditiously any information, during the lifetime of the project as requested by the National CDM Authority.
- M/s GSIL shall obtain all statutory clearances and other approvals as required from the competent authorities for setting up of the project.
- All transactions shall be subject to supervision of the Executive Board of the CDM, under the authority and guidance of the COP/MOP.
- This approval is not transferable. The authority reserves the right to revoke this Host Country Approval if the conditions stipulated in this approval are not complied with to the satisfaction of the National CDM Authority.

Yours faithfully,

(R. N. Sankar)
Director (CC)


अर्थ है इतियासी।
वर्ग है लुहासी।।

पर्यावरण भवन, सी.जी.ओ. कॉम्प्लेक्स, लोदी रोड, नई दिल्ली-110003
PARYAVARAN BHAWAN, C.G.O. COMPLEX, LODHI ROAD, NEW DELHI-110003

Host Country Approval Letter