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

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

>>
15 Mw Biomass Co-Generation in Andhra Pradesh.

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

>>
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/cm^2 (majority are in the range of 21 kg/cm^2 to 45 kg/cm$^{2)}$ 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 bagasses 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 Indian Sugar Mill Association, there are 507 sugar mills in India. The total potential for bagasses co-generation being in excess of 5000[1] Mw, as against this, the installed capacity is a mere 750 Mw[1] (at an average of ~ 1.5Mw / mill). Of the 507[1] sugar mills in India, only 30 have cogeneration systems which are capable of meeting their in-house captive requirement as well as wheeling power to the grid among those only 16 are of a high pressure configuration out of which only 12 mills are successfully exporting power to the grid. This 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.

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 :Indian Sugar Mill Association http://www.indiansugar.com/sugarstn.htm, ISMA publications

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
15 Mw Co-generation unit – fuel bagasses + biomass	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 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 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.3. Project participants:

>>Ganpati Sugar Industries Limited

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 Mondal, 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)

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

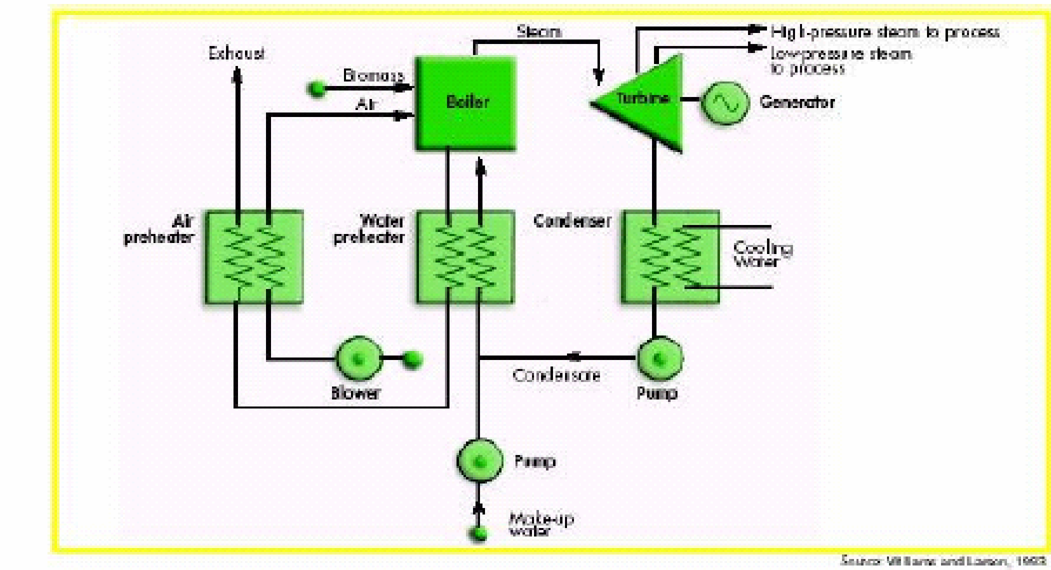
>>Type I – Renewable Energy Projects

I D – Renewable Energy 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 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. [2]



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

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

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 480°C using bagasse as the primary fuel and other biomass as secondary fuel. .

PROJECT DETAILS		
	Old	**Phase 1 – 15 MW**
Boiler		
Capacity	35 TPH x 2	75 MTH/1
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	
Power Generated		
Season	6 MW	15Mw
Off Season	Nil	Nil
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 of 15 MW, 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:

>>

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 bagasses being dumped in open uncontrolled land fills, 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.

Bagasses are 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 mils, burning bagasses 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 2003[3] , 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.

The fact that (according to the Indian Sugar Mill Association) of the 507 sugar mills in India, with a combined co-generation potential for generating bagasses co-generation power in excess of 5000Mw[4], the total installed capacity is a mere 750 Mw[1] (at a simple average of ~ 1.5Mw / mill). The 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 large (15 Mw+) high pressure configuration co-generation / biomass power plants in the country.

2. High pressure bagasses co-generation in Indian sugar mills is NOT a standard business practice. This is further substantiated by the fact that of the 507[1] sugar mills in India, only 30 have cogeneration systems of which only 16 Are of a high pressure configuration and only 12 Mills are successfully exporting power to the grid i.e. **less than 3% of the mills export power to the grid.**

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 is the perceived and actual risks associated with such capital intensive projects namely:

- There are NO regulatory/ other regulations requiring sugar mills to set up bagasses / 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.

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[3] www.powermin.nic.in

[4] Source :Indian Sugar Mill Association http://www.indiansugar.com/sugarstn.htm

- Availability of Raw material / fuel: The availability of biomass fuel (primarily bagasses) 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 bagasses) 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 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 bagasses 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:

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

Phase 1 – 15 MW			
Year	***Electricity exported to the Grid and captive power generated-GWh***	***Carbon Emission Factor tCO2e /GWh***	***CERs generated tCO2e***
2003	53.688	937.41	50,328
2004	36.253	937.41	33,983
2005	54.432	937.41	51,025
2006	54.432	937.41	51,025
2007	54.432	937.41	51,025
2008	54.432	937.41	51,025
2009	54.432	937.41	51,025
Total estimated reductions			**3,39,436**
Total number of crediting years			**7**

Annual average over the crediting period of estimated reductions (tones of CO_2 e)	48,491

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:

>>
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 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
I D - Renewable electricity generation for a grid

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

>>
The project produces renewable energy from the combustion of bagasse. The plant is grid connected and the electricity supplied from the project activity to the grid would be expected to supplement existing and planned electricity 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:

>>

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 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 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 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 pay masters 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 (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 bagasses co-generation in excess of 5000[5] Mw, , only 30 mills have co-generation facility (installed capacity a mere 750 Mw[1] (at an average of ~ 1.5Mw / mill)). Of these 30 mills, only 16 are of high pressure configuration, of which only 12 are exporting power to the grid. This 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.

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.

---

[5] Source :Indian Sugar Mill Association http://www.indiansugar.com/sugarstn.htm

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.

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

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 $KgCO_2$/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:

>> January 2003

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 cross checked 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*	*Electricity supplied to the grid from the project.*
2	*Electricity consumed for captive power purposes*	*Plant Records*	*MWh*	*M*	*Hourly*	*100%*	*Electronic*	*Electricity supplied to the refinery plant from the project.*
3	*CEF of the grid*	*CEA Annual Generation Report & Local Statistics Available*	tCO_2e /GWh	c	Annual	100%	electronic	*Calculated as the weighted sum of OM and BM Emission Factor*
4	*CEF Operating Margin of the grid*	*CEA Annual Generation Report & Local Statistics Available*	tCO_2e /GWh	c	Annual	100%	electronic	*Calculated based on Simple OM CEF as indicated in the baseline methodology*
5	*CEF Build Margin of the grid*	*CEA Annual Generation Report & Local Statistics Available*	tCO_2e /GWh	c	Annual	100%	electronic	*Calculated based on Simple BM CEF as indicated in the baseline methodology*

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*	*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.
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.

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:

>>
Monitoring and recording of electricity exports will be carried out by the GSIL's power division. 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 cross checked 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

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:

>>

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[5] from the grid.

$COEF_{i,j\,y}$ Is the CO_2 emission coefficient of fuel *i* (tCO_2 / 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*.

$COEF = NCVi * EF_{CO2,i} * OXIDi$

where

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

$EF_{CO2,i}$ Is the CO_2 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 tCO_2/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 CO_2.
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 CO_2 baseline emission factor for the electricity displaced due to the project activity in during the year y in tons CO_2/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 **3,39,432** 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	50328	33,983	51025	51025	51025	51025	51025
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	50328	33,983	51025	51025	51025	51025	51025

SECTION F.: Environmental impacts:

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

>> Nothing significant

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 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:	P.M. Nair
Title:	Director
Salutation:	Mr.
Last Name:	Nair
Middle Name:	
First Name:	P.M
Department:	Operations & Research

Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no funding from Annex- I parties

Annex 3

BASELINE INFORMATION

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 CO_2equ / 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 2003	Emission Factor IPCC tCO2/GWh	Emissions tCO2e 2003	year of commissioning
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		Diesel	355	638	226629	
Yelahanka	VVNL		Diesel	715	638	456451	1993
Karnataka Hydro			Hydro	4423	0	0	
Kaiga	NPC	440	Nuclear	3317	0	0	2000
Andhra Pradesh							
K_Gudam	APGENCO		Coal 3E	8729	1327	11587327	1998
Vijayawada	APGENCO		Coal 3E	10288	1044	10735883	1995
Ramagundam	APGENCO	62.5	Coal 3E	390	1281	499509	1971
Nellore	APGENCO		Coal 3E	147	1487	218619	1965
Rayal Seema	APGENCO		Coal 3E	3488	1053	3671571	1995
Vijeshwaran	APGPC		Gas	2031	484	982059	
Peddapuram CCGT	REL	220	Gas	850	484	411005	2002
Jegurupadu GT	GVK		Gas	1583	484	765436	

Kondapalli	Kondapalli Th		Gas	2477	484	1197716	
LVS Power	LVS Power	36.8	Diesel	2	638	1277	2001
Godavari GT	Spectrum		Gas	1250	484	604419	
R'gundam STPS	NTPC	2100	Coal	16839	1053	17731618	1989
Simhadri	NTPC	1000	Coal	4974	1053	5237667	2002
AP Hydro			Hydro	3665	0	0	
Kerala							
Brahamapuram DG	KSEB		Diesel	267	638	170451	
Kozikode DG	KSEB		Diesel	385	638	245781	1999
Cochin CCGT	REL		NG	305	484	147478	1999
Kasargode	RPG		Diesel	148	638	94482	
Kayamkulam	NTPC	350	NG	2127	484	1028479	1999
Kerala Hydro			Hydro	4860	0	0	
TamilNadu							
Ennore	TNEB		Coal 3E	1747	1694	2958841	1970
Tutikorin	TNEB		Coal 9T	8187	1063	8703408	1979
Mettur	TNEB		Coal 9T	6739	1063	7164073	1987
North Chennai	TNEB		Coal 3E	4405	1053	4638574	1994
Basin Bridge	TNEB		NG	276	484	133456	1996
Nariman GT	TNEB		NG	0	484	0	
Valuthur GT	TNEB		NG	104	484	50288	2003
Kovilakalappal	TNEB		NG	726	484	351046	
Samayanallur	Madurai P		Diesel	589	638	376013	2001
Neyveli	Pvt		Lignite	406	1225	497544	2002
P Nallur CCGT	PPNPG		NG	2169	484	1048787	2001
Samalpatti DG	Samalpatti		Diesel	623	638	397718	2001
Basin Bridge DG	Vasavi		Diesel	1209	638	771816	
Neyveli STI	NLC Th		Lignite	4421	1225	5417835	1970
Neyveli STII	NLC Th		Lignite	10495	1225	12861385	1993
Neyveli FST Ext	NLC Th		Lignite	89	1225	109067	2003
TN Hydro			Hydro	2729	0	0	
MAPP,kalpakam	NPC	340	Nuclear	1073	0	0	1986
Wind	Pvt		Wind	1305	0	0	
Pondichery							

Karaikal GT	PPCL		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

$\sum F_{i,j,y} \times COEF_{i,j}$	∑ GEN i,,j	∑ 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**	**Installed Capacity**	**Fuel**	**Generation GWh**	**Cummulative Generation (GWh)**	**Emission Factor IPCC**	**Emissions tCO2e**	**Year of commissioning**
				2003	**2003**	**tCO2/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	210	Coal 3E	1470	1663	1080	1586892	2002
Peddapuram CCGT	REL	220	Gas	850	2513	484	411005	2002
Simhadri	NTPC	1000	Coal	4974	7487	1053	5237667	2002
Neyveli	Pvt		Lignite	406	7893	1225	497544	2002
Tanir Bavi	GMR	220	Naptha	1280	9173	638	817142	2001
LVS Power	LVS Power	36.8	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	440	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	350	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	1260	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
Rayal Seema	APGENCO		Coal 3E	3488	50556	1053	3671571	1995
North Chennai	TNEB		Coal 3E	4405	54961	1053	4638574	1994
Yelahanka	VVNL		Diesel	715	55676	638	456451	1993
Neyveli STII	NLC Th		Lignite	10495	66171	1225	12861385	1993
R'gundam STPS	NTPC	2100	Coal	16839	83010	1053	17731618	1989
Mettur	TNEB		Coal 9T	6739	89749	1063	7164073	1987
MAPP,kalpakam	NPC	340	Nuclear	1073	90822	0	0	1986
Tutikorin	TNEB		Coal 9T	8187	99009	1063	8703408	1979
Ramagundam	APGENCO	62.5	Coal 3E	390	99399	1281	499509	1971
Ennore	TNEB		Coal 3E	1747	101146	1694	2958841	1970
Neyveli STI	NLC Th		Lignite	4421	105567	1225	5417835	1970
Nellore	APGENCO		Coal 3E	147	105714	1487	218619	1965
Bellary	Pvt	25.2	Diesel	64	105778	638	40857	
Total				105778			108424032	

Step 3: Calculation of Baseline Emission Factor Efy, as the weighted average of Operating Margin Emission Factor and Build Margin Emission Factor:

Southern region emission factor

A	20% of state grid	26736
B	Plants meeting 20%	27684
C	Last Five Plants Total	7487
∑ Fi,,j,y x COEF i,,j for C(t CO2)		23670601
∑ EF BM,y (tCO2/GWh)		855.03

Average ∑ EF BM,y	855.03
Average ∑ EF OM,y	1019.80

∑ EFy (Avg of OM &BM)	**937.41**	**(tCO2/GWh)**

Annex 4

MONITORING PLAN

This monitoring protocol is designed for the 15 MW Ganapthi Co-generation Project which is being implemented in AndhraPradesh, India. This monitoring plan, which will be registered with the CDM EB as a part of the Project Design Document, describes the monitoring organisation, parameters and variables, monitoring practices, QA and QC procedures, data storage and archiving etc. Project participants implement this monitoring plan right from the start of the implementation of the project.

PARAMETERS TO MONITOR

As detailed in the project design document under Section – D, the unique variable that will be monitored in this project activity is the quantity of energy exported to the grid, from year 2003 up to the end of the last crediting period. Since no leakage nor any off-grid emissions change were identified in this project activity, there will be no need to monitor the variables for these cases. The monitoring will occur as follows:

The quantity of energy exported to the grid will be monitored through the energy invoice submitted by Ganapathi Co-generation Project to the grid. The archiving will occur up to two years after the end of the crediting period or the last issuance of CERs for this project activity, or whatever occurs later. The amount of energy will be registered in an electronic form, which shall be the instrument for the further Verification.

MONITORING PRACTICE

The project developers shall install all metering and check metering facilities within the plant premises as well as in the State Electricity Board Substation where exported power is connected to the grid. This will be recorded and monitored on a continuous basis and certified the Monthly report by both State Electricity Board and the project proponents.

Power generation at plant premises	KW	
Aux. Consumption at plant premises	KW	
Net Energy export	KW	
Energy reading at APSEB Sub-station	KW	
Transmission & Distribution losses	KW	

QA AND QC PROCEDURES

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.

DATA STORAGE AND ARCHIVING

All the above parameters monitored under the monitoring protocol will be kept for 2 years after the end of crediting period or the last issuance of CERs for this project activity whichever occurs later.

The monitored data will be presented to the verification agency or DOE to whom verification of emission reductions is assigned.

Necessary formats / tables / log sheets etc. will be developed by the project participants for monitoring and recording of the data and will be made part of the registered monitoring protocol.

- - - - -

Annex 5

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

Ref.No.GSIL/SRD/2000/1321

Date : 10th 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 cm² (ATA)	67 Kg cm²
Numbers	2	1
Turbine		
Capacity	3 MW	15 MW
Temperature	360 ° C	480 ° C
Pressure	32 Kg cm²	
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.....

Continuation Sheet

...NPATI SUGAR INDUSTRIES LTD.

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- The project will put the district in the global map for green power as a result of the project being registered under the Clean Development Mechanism of the Kyoto Protocol.

We would now request to kindly let us know if you need any clarifications on the proposed project and whether you would need any clarifications to further understand the project and its impact on the local community.

Thanking you

Yours faithfully
For GANPATI SUGAR INDUSTRIES LIMITED

(M. JANAKI MANOHAR)
PRESIDENT

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

GRAM PANCHAYAT

Fasalwadi Village

Date : 13th April 2000.

To

M/s. Ganpati Sugar Industries Ltd.
Fasalwadi Village,
SANGAREDDY.

Dear Sir,

Further to your latest [illegible] 2000. We are indeed very happy that you are setting up the [illegible] heartening to know that the Medak District will be one of the first districts to have a project registered under the Clean Development Mechanism of the Kyoto Protocol.

We would however request you make the details of the project available to us and also let us know the measures being taken to prevent any leakage of the effluents [illegible] into the local eco-system.

We really welcome the initiative and would like to wish you all the best for this.

Thanking you

Yours truly

SARPANCH
G.P. FASALWADI
శ్రీమతి చింతల కల్పలత
సర్పంచ్
గ్రామ పంచాయతీ, ఫసల్‌వాడి.

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/cm2g). 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. (75 tonnes 67 Kgs/cm2g boiler and 15 MW turbines).

As the technology is new, we are contemplating to get services of M/s Avant Garde Engg. Garde Engg., 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. NAIR
DIRECTOR (O&P)

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 & Projects)

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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 22483195

Fax: (91) 4

15th February, 2000

Mr. P.M Nair
Director
Ganpati 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 alias 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.