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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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Capacity enhancement for export of surplus power to grid ("project activity") at Lakshmipuram, Andhra Pradesh, India.

Version 01

23/04/2007

A.2. Description of the project activity:

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Purpose

The project activity aims at bringing in greenhouse gas emission reductions by producing green power out of bagasse resulting from the core process (sugar manufacturing). KCP Sugar and Industries Corporation Limited have one of their sugar factories located at Lakshmipuram in Andhra Pradesh wherein the project activity is located. Though the sugar mill had the potential to generate surplus power in addition to the captive requirements, the available potential was not tapped until the recent capacity enhancement. The project activity involves installation of a new 3 MW turbo generator of backpressure type that will operate only during the cane crushing season and export power to the grid. The seasonal operation is expected to last for one hundred days per year and the project activity will export approximately 5.1 Million kWhs of electric power per annum to Southern Power Distribution Company of Andhra Pradesh Limited (APSPDCL) grid.

Contribution to Sustainable Development

The project activity imparts a direct impact by improvement in quality of life of local people by providing inflow of funds, additional employment, technological & managerial capacity building etc. As the project activity generates green power, it has positively contributed towards the reduction in (demand) use of finite natural resource like coal/gas/oil, minimizing depletion and in turn increasing its availability for other important purposes. The local populace has become aware of the technological advancement, which has helped in capacity building. The project activity also helps in bridging the gap of electricity demand and supply at local and national levels. Further, the project activity has demonstrated the concept of grid

connected electricity generation through renewables. The project activity also improves the cash flow to the sugar mill that would transform into overall development of the surrounding region.

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
India (Host Country)	KCP Sugar and Industries Corporation Limited (Private Entity)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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India

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

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Andhra Pradesh

A.4.1.3. City/Town/Community etc:

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Lakshmipuram, Krishna District

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

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The project activity is located at Lakshmipuram village of Challapali Mandal in Andhra Pradesh. The project site lies at latitude 18^{o} 23' North and longitude 82^{o} 25' East and is 100m above the mean sea level. The project activity is located close to Challapalli on the Machlipatnam highway and is easily accessible by road and rail.

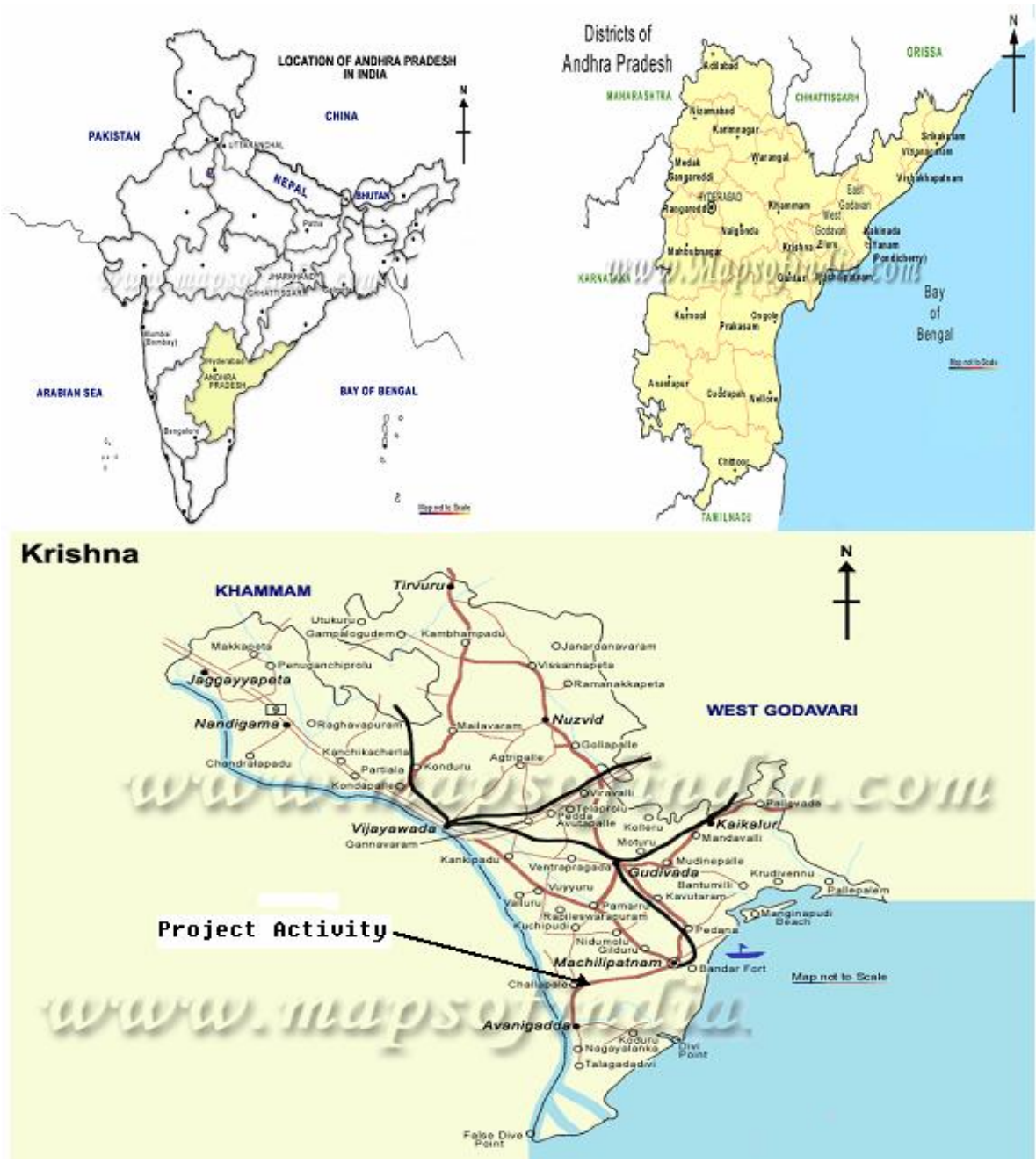

Figure A.1: Project location

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

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The project activity may be classified as a renewable energy project since it uses renewable biomass to generate electricity and export to the grid. Therefore the project activity is categorized under Category 1: Energy industries (renewable - / non-renewable sources) as per the scope of the project activities enlisted in the latest 'List of Sectoral Scopes' for accreditation of operational entities.

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

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The project activity involves enhancement of the power generation capacity with the installation of a 3MW turbo generator. The captive energy requirements of the KCP SICL sugar mill are taken care of by the already existing 4.25MW cogeneration system. Now that the additional 3MW system is in place, it opens up the possibility of export of renewable based electricity to the grid. The new 3MW turbine is of backpressure type and the extracted steam is used for process requirements. The existing 3MW and 1.25MW turbines cater the steam and power demand of the sugar mill, whereas the surplus power generated by the new 3MW turbine is fed to the grid. The new back pressure turbine utilizes energy from the high pressure (43 kg/cm^2 and 400^{o}C) steam decreasing its pressure and velocity before exhausting it at low pressure (2.5 kg/cm^2 and 160^{o}C) to process requirements. Before the project activity, the high pressure steam was throttled through a Pressure Reducing and De-superheating Station (PRDS) to meet the low pressure process requirement. The power generation from the turbine will be at 415V at the generator terminals. It is then stepped up to 33kV and paralleled with Challapalli substation, which is adjacent to the project site. The steam used in the sugar plant process is returned as feed water. The output power from the turbo generator is connected to Low Tension (L.T) panels through L.T bus duct.

From the L.T panel, it is connected to the step up transformer (415/33kV). The output of step up transformer is evacuated to Challapalli substation through 33kV cable and connected to the incoming line of Challapalli substation. An estimate of 5.1 Million kWhs (per annum) of electric power is expected to be exported to grid of Southern Power Distribution Company of Andhra Pradesh Limited (APSPDCL). As the turbine is of backpressure type, the power export will happen only during season, which is around one hundred days per year. The bagasse resulting out of sugar production process is effectively utilized in the cogeneration plant to generate clean power and supplements the grid with approximately 51 Million kWhs over the identified crediting period (2007-2017).

The steam turbine installed as part of the project activity is purchased from one of the leading suppliers in the country and is of the best configuration available for the specific operating conditions. The TG is of multistage, horizontal spindle, two bearing with hydraulically operated valves and integral steam strainer at turbine inlet. Throttle valves for turbine inlet steam flow control are hydraulically operated. The gear box is single helical type, single reduction with hardened and ground gears. The alternator is of a reputed make with brushless excitation and class F insulations. The auxiliary systems like fuel handling, feed water treatment systems, ash handling, effluent treatment system etc., are modern and latest with the best of

available control systems. A schematic diagram of the pre-project and project scenarios are provided below for better understanding.

Figure A.2: Pre-project Scenario

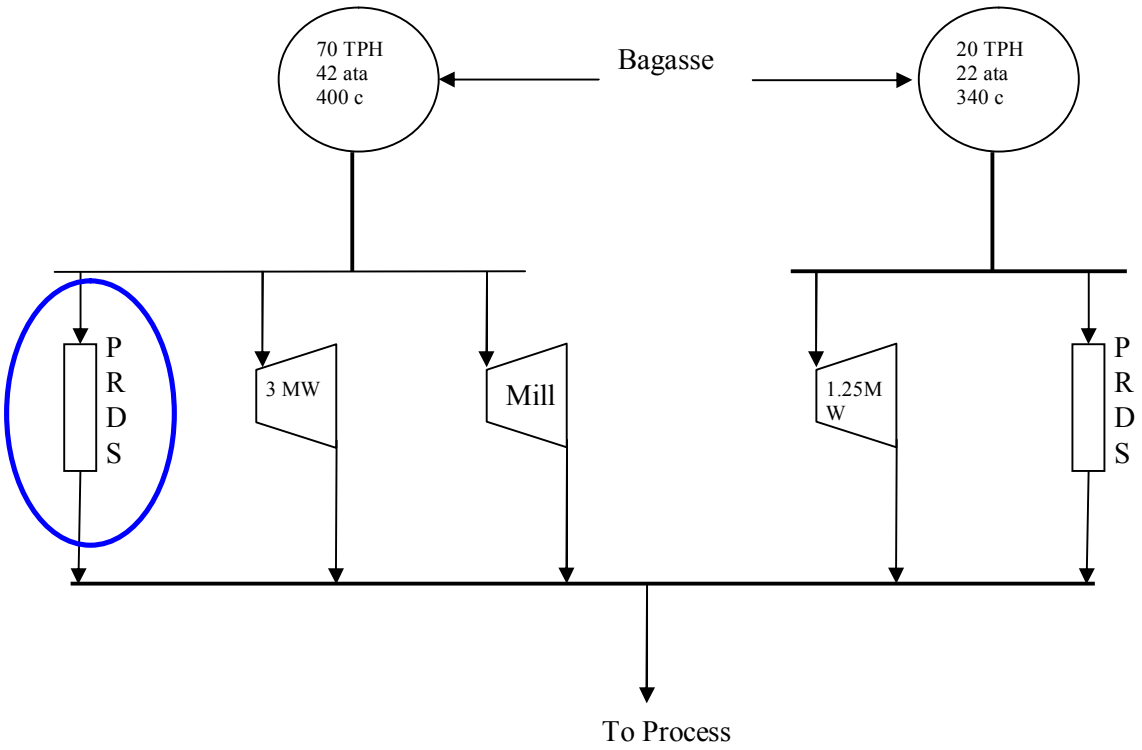
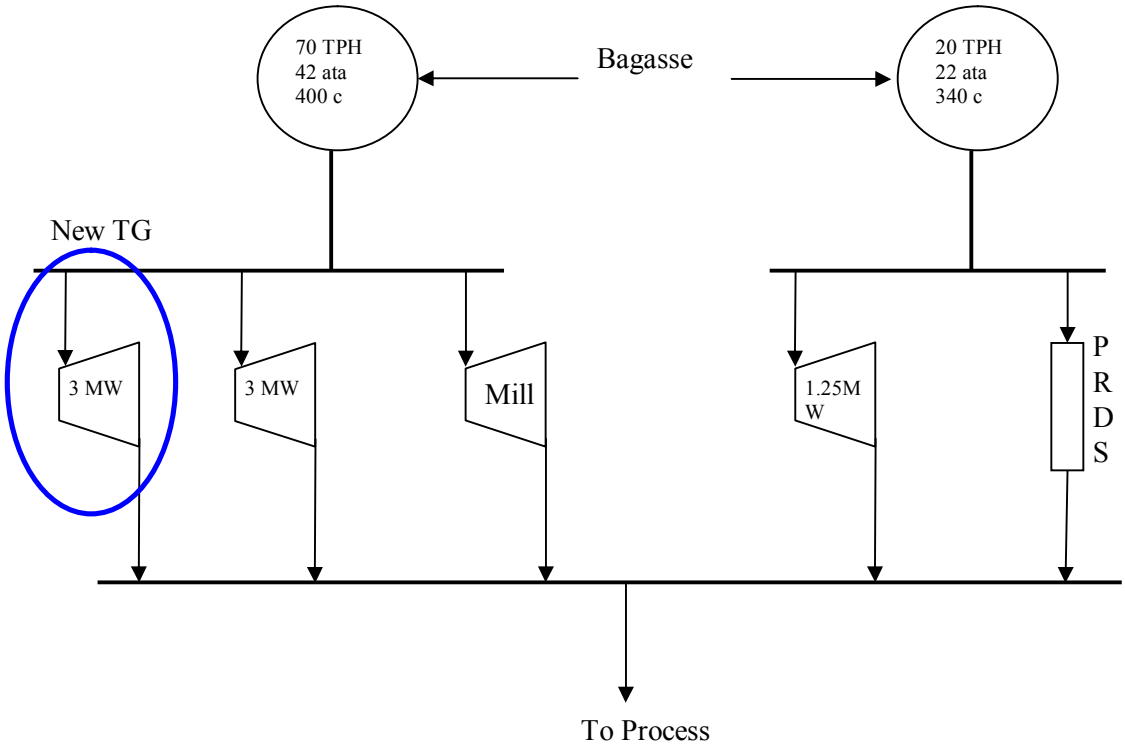


Figure A.3: Project Scenario



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

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Year	Annual estimation of emission reductions in tonnes of tCO_2e
2007-08	4,428
2008-09	4,428
2009-10	4,428
2010-11	4,428
2011-12	4,428
2012-13	4,428
2013-14	4,428
2014-15	4,428
2015-16	4,428
2016-17	4,428
Total estimated reductions (Tonnes of CO_2e)	**44,280**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	4,428

A.4.5. Public funding of the project activity:

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There is no public funding from Annex I parties for this project activity

SECTION B. Application of a baseline and monitoring methodology

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

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Title: Consolidated baseline and monitoring methodology for grid-connected electricity generation from biomass residues (ACM0006) Version 04

Reference: This consolidated baseline and monitoring methodology (ACM0006) is based on elements from the following methodologies:

- AM0004: "Grid-connected Biomasss Power-Generation that avoids uncontrolled burning of biomass which is based on the A.T Biopower Rice Husk Power Project in Thailand."
- AM0015: "Bagasse-based cogeneration connected to an electricity grid based on the proposal submitted by Vale do Rosario Bagasse Cogeneration, Brazil."
- NM0050: " Ratchasima SPP Expansion Project in Thailand."
- NM0081: "Trupan biomass cogeneration project in Chile."
- NM0098: "Nobrecel fossil to biomass fuel switch project in Brazil"

This methodology also refers to the ACM0002 ("Consolidated baseline methodology for grid-connected electricity generation from renewable sources") and the latest version of the *"Tool for the demonstration and assessment of additionality"*.

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

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Among the methodologies approved by UNFCCC for biomass based CDM project activities, ACM0006 has been chosen as most suitable to this project activity. The project activity meets the applicability conditions of ACM0006, as demonstrated below:

Conditions of ACM0006	Applicability to project activity
Applicable to grid connected and biomass residue fired electricity generation project activities	Bagasse fired in the project activity is a biomass residue. The project activity is connected to the APSPDCL grid to which it exports surplus electricity
Project activity may include the installation of a new biomass power generation plant at a site where currently no power generation occurs	Not relevant to the project activity
May be based on the operation of a power generation unit located in an agro-industrial plant generating the biomass residues	Based on the efficiency improvement of a power generation unit located in a sugar plant
Biomass residues are defined as *biomass* that is a by-product, residue or waste stream from agriculture, forestry and related industries. This shall not include municipal waste or other wastes that contain fossilized and/or non-biodegradable material.	Bagasse used in the project activity is a residue from agriculture related industry (sugar plant)
No other biomass types than *biomass residues*, as defined above, are used in the project plant and these biomass residues are the predominant fuel used in the project plant (some fossil fuels may be co-fired).	Bagasse will be used as the predominant fuel.
For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process.	The project activity uses the residue (bagasse) from sugar manufacturing. The production process is independent of the project activity and shall not result in increase of the sugar plant crushing capacity.
The biomass used by the project facility should not be stored for more than one year.	Bagasse is not stored on the site for more than one year.
No significant energy quantities, except from transportation of the biomass, are required to prepare	The preparation of bagasse doesn't involve significant energy consumption.

the biomass residues for fuel combustion	
The methodology is only applicable for the 17 combinations of project activities and baseline scenarios identified in the methodology.	Project activity fits in scenario 14.

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

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The project boundary encompasses the point from where the fuel supply starts to the point where power is exported to the grid i.e. the area on which the project promoter has full control of.

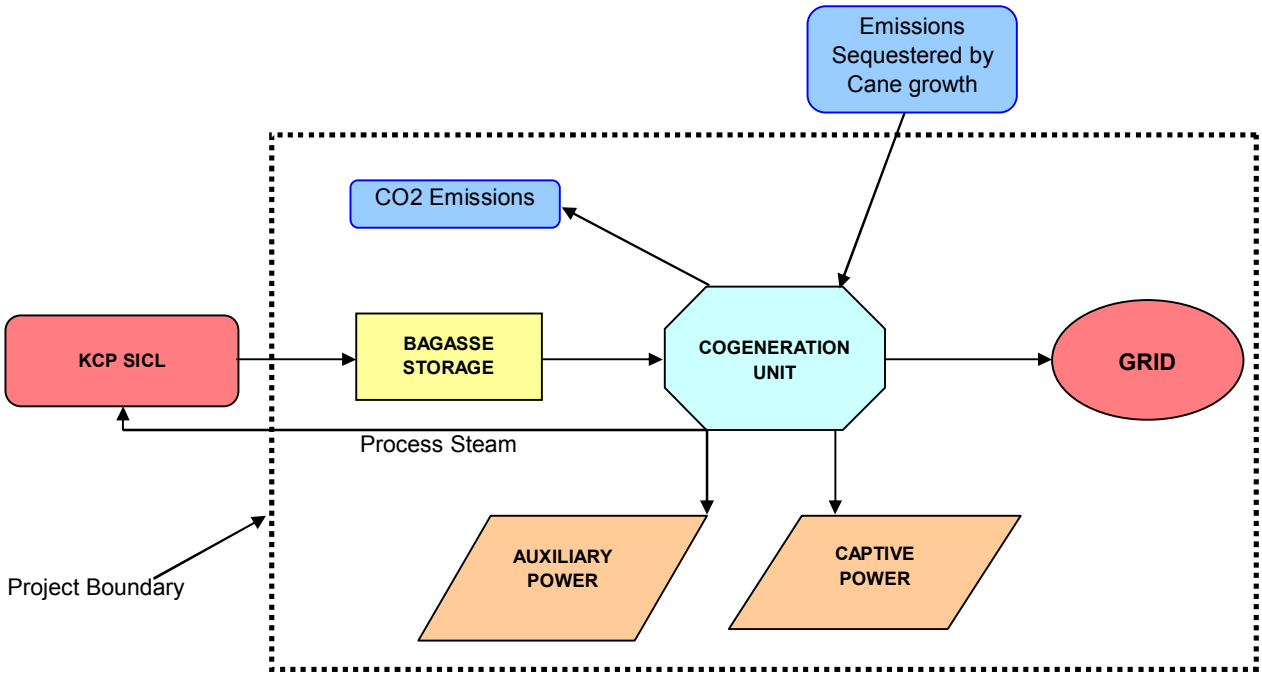

Figure B.1: Project boundary

The project participants have included in the project boundary, GHG emissions sources from the project activity and emission sources in the baseline, as prescribed by the methodology ACM0006. The project boundary includes the following emission sources:

	Source	Gas		Justification/Explanation
Baseline Scenario	Grid Electricity Generation	CO_2	Included	Main Emission source.

		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Heat Generation in Onsite boilers	CO_2	Excluded	Heat generation is using biomass as fuel.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Decay or uncontrolled burning of surplus biomass	CO_2	Excluded	No surplus biomass
		CH_4	Excluded	No surplus biomass
		N_2O	Excluded	No surplus biomass
Project Scenario	Onsite fossil fuel combustion due to the project activity	CO_2	Included	Important emission source.
		CH_4	Excluded	Excluded for simplification. This quantity is very small.
		N_2O	Excluded	Excluded for simplification. This quantity is very small.
	Offsite transportation of biomass	CO_2	Included	An important emission source.
		CH_4	Excluded	Excluded for simplification. This quantity is very small.
		N_2O	Excluded	Excluded for simplification. This quantity is very small.
	Combustion of biomass for electricity and/or heat	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass residues do not lead to

	generation			changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	This emission source must be included only if CH4 emissions from uncontrolled burning or decay of biomass in the baseline scenario are included.
		N_2O	Excluded	Excluded for simplification. This quantity is very small.
	Biomass storage	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded for simplification. Since biomass is stored for not longer than one year, this emission source is assumed to be small.
		N_2O	Excluded	Excluded for simplification. This quantity is very small.

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

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As prescribed by ACM0006, project participants have determined the most plausible baseline scenario among all realistic and credible alternatives separately regarding:

- How power would be generated in the absence of the CDM project activity
- What would happen to the biomass in the absence of the project activity
- In case of cogeneration projects: how heat would be generated in the absence of the project activity

The following paragraphs illustrate the various potential alternatives, and the most plausible baseline scenario is determined using steps 2 (Benchmark analysis) and 3 (Barrier analysis) of the "tool for the assessment and demonstration of additionality" as prescribed by the methodology.

Power generation: How power would have been generated in the absence of the project activity?

Alternatives available for power generation:

1. *Option P5: Continuation of power generation at the existing power plant fired with the same type of biomass as the project activity, and implementation of the project activity not undertaken as a CDM project activity, at the end of the lifetime of the existing plant*
2. *Option P1: Implementation of the project activity not undertaken as a CDM project activity*
3. *Option P4: Power generation in existing and/or new grid connected power plants*

Identification of most likely baseline power generation scenario:

In Option P5 scenario, the project proponent would continue to operate the cogeneration plant in its pre-project configuration (Refer Figure A.2). The low pressure process steam requirement would continue to be met by the in-efficient method of extracting through the PRDS. In this scenario, the quantity of power generated would just be sufficient to meet in-house utilization or captive consumption only. This alternative does not entail surplus power generation and export to an electricity grid. It does not require any additional investment or risk. It is in compliance with all applicable legal and regulatory requirements and could be the baseline. The surplus power that is exported to the grid in the project scenario would have been generated in existing or new grid connected power plants (Option P4). The cogeneration plant would have continued operating in this configuration till the end of its lifetime.

The project scenario involves replacing the PRDS and retrofitting a backpressure TG to increase the power generation and thus the overall cogeneration efficiency. Though this proposal is in compliance with all legal and regulatory requirements, it was not economically attractive and also faced prohibitive barriers (Refer B.5.3). Under normal circumstances, KCPSICL would not have implemented this proposal. Thus the Option P1 scenario would not be a baseline alternative.

Criteria	**Option**		
	P5	**P1**	**P4**
Economic Viability	No	Yes	Yes
Policy Barrier	Yes	No	No

The most likely baseline power generation scenario would be a combination of Option P5 (Power generation in existing plants) and Option P4 (in grid connected power plants).

Heat (steam) generation: How heat would be generated in the absence of the project activity?

Alternatives available for heat generation:

1. Option H5: Continuation of heat generation in the existing cogeneration plant (through PRDS) fired with the same type of biomass as in the project activity and implementation of the project activity not undertaken as a CDM project activity, at the end of the lifetime of the existing plant.

2. Option H1: Implementation of the project activity not undertaken as a CDM project activity.

Identification of most likely baseline heat generation scenario using barrier analysis:

Since the project activity is a cogeneration activity, the alternatives for heat generation are similar and associated to the alternatives for power generation. Therefore, analysis of the power generation alternatives (above) applies as well to heat generation.

In Option H5, the process heat requirement of the sugar factory would have continued to be met by the pre-project cogeneration system (i.e., through PRDS). In the absence of the project activity, the pre-project cogeneration system would have continued to operate without any problems till the end of the crediting period and the factory would have continued to meet its heat requirement from the system. There is no policy or regulation enforcing the replacement of the PRDS with the capital intensive backpressure TG. KCPSICL could have continued heat generation in the pre-project system.

Under normal circumstances, KCPSICL would not have implemented the project activity since the proposal was not financially attractive. Therefore, the implementation of the project activity without CDM (Option H1) is not a baseline alternative.

Criteria	**Option**	
	H5	**H1**
Economic Feasibility	Yes	No
Policy Barrier	No	Yes

The most likely baseline heat generation scenario would be Option H5.

Biomass: What would happen to the biomass in the absence of the project activity?

Alternatives available for biomass:

1. Option B4: The biomass would have been used for heat and/ or electricity generation at the project site

The project activity does not involve replacement or modification in the boilers. The boiler efficiency remains unchanged in the pre-project and project scenario. The same type and quantity of biomass would be required in the pre-project and project scenario. Therefore in the absence of the project activity, the biomass would have been used to generate heat and power at the project site (i.e., Option B4). There are no other alternatives for biomass. The most likely baseline biomass scenario would be Option B4.

Most plausible baseline scenario for the project activity:

The above analysis shows that the most likely baseline scenario is a combination of:

- Option P4 and P5: Continuation of power generation at the existing power plant (pre-project configuration with PRDS) fired with the same type of biomass as the project activity and partly in existing and/or new grid connected power plants.
- Option H5: Continuation of steam generation in the existing (pre-project) power plant fired with the same type of biomass as the project activity
- Option B4: Use of biomass to generate heat and power at the project site

Baseline scenario 14 of ACM0006 is the applicable baseline scenario for the project activity.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

In order to demonstrate that the CDM project activity reduces anthropogenic GHG emissions that would have occurred in the absence of the project activity, it is necessary to prove that:

- The implementation of the project activity is not the baseline scenario, (i.e., under normal circumstances, there would be no increase in the cogeneration efficiency in the project plant and thereby KCP SICL would not export power to the grid).

ACM0006 prescribes the use of the "Tool for the demonstration and assessment of additionality" (Figure B.2) for the above purpose, which is applied to the project activity as described further:

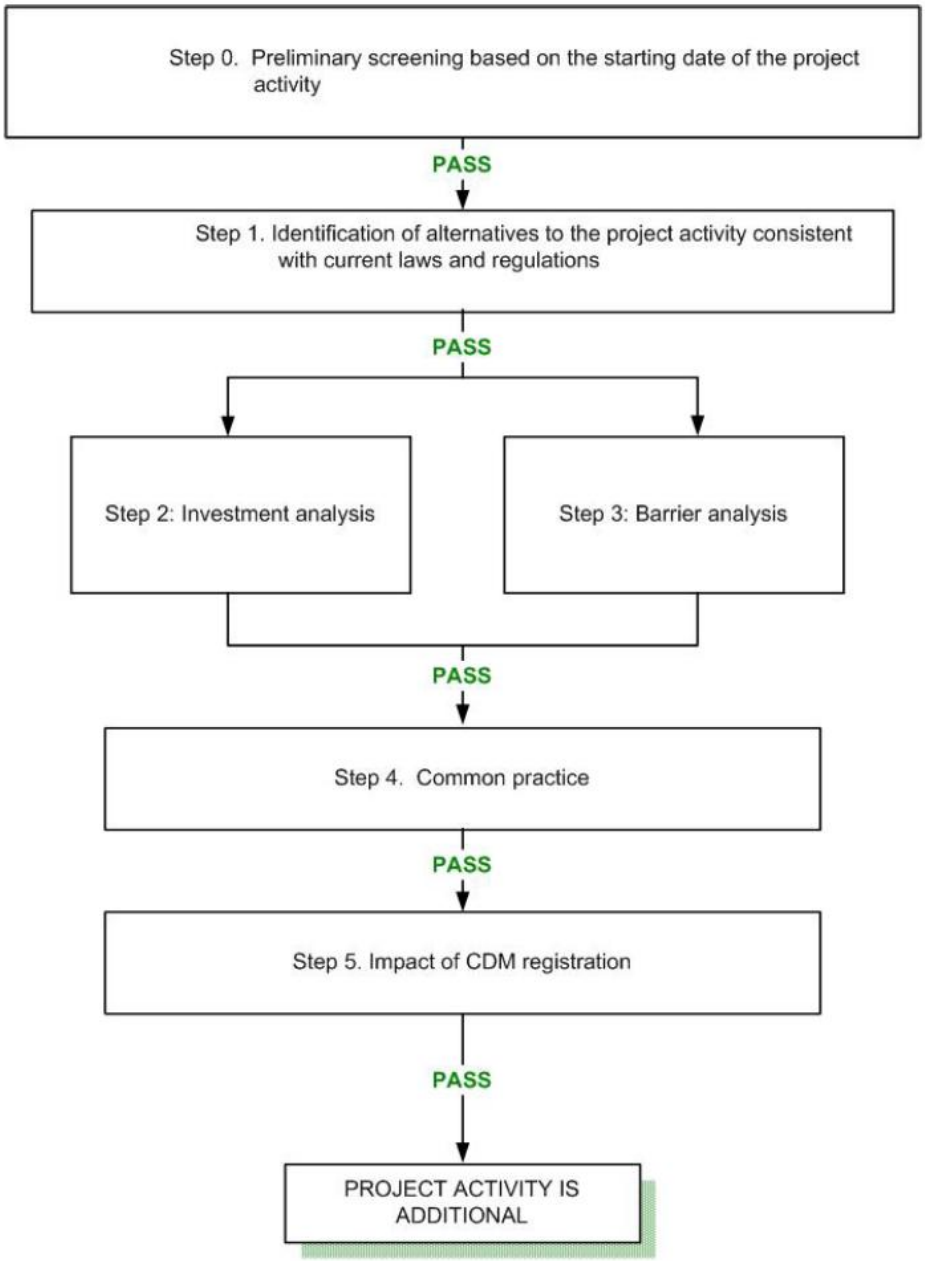

Figure B.2: Tool for the demonstration of Additionality

B.5.1 Step 0: Preliminary screening based on the starting date of the project activity

The project promoters do not wish to have the crediting period prior to the registration of the project activity. However, the consideration of CDM incentive prior to starting the project activity is described below:

During 2004, KCP SICL explored the surplus power generation potential at its Lakshmipuram sugar plant by efficiency enhancement of the cogeneration system. A proposal of the project activity including techno-economic parameters and preliminary estimates of carbon credits was submitted to KCP SICL Management for approval. The various aspects of the proposal were discussed in the Board of Director's Meeting held in May 2004 during which KCP SICL management took a decision to go ahead with the project. KCP SICL considered that the prospective CDM revenues could help offset the risks faced by the project activity and enable its long term sustainability.

B.5.2 Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations

Project participants have determined the most plausible baseline scenario among all realistic and credible alternatives separately regarding:

- How power would be generated in the absence of the CDM project activity
- What would happen to the biomass in the absence of the project activity
- In case of cogeneration projects: how heat would be generated in the absence of the project activity

In sub-step 1a and 1b, KCP SICL is required to identify realistic and credible alternative(s) that were available to KCP SICL or similar project developers that provide output or services comparable with the project activity. These alternatives are required to be in compliance with all applicable legal and regulatory requirements.

- **Sub-step 1a. Define alternatives to the project activity**
  - KCP SICL identified the different potential alternative(s) to the project activity available to all other sugar-manufacturing units in the region. The alternatives have been analysed using (steps 2 and 3 of the "Tool for demonstration of Additionality") and the most plausible baseline scenario has been identified in Section B.4.

Summary on alternatives

Considering the alternatives explained in section B.4 above, it can be inferred that for the project activity, the most likely alternatives consistent with current laws and regulations are:

1. A combination of:

- Option P4 and P5: Continuation of power generation at the existing power plant (pre-project configuration) fired with the same type of biomass as the project activity and partly in existing and/or new grid connected power plants.
- Option H5: Continuation of steam generation at the existing power plant (pre-project configuration) fired with the same type of biomass as the project activity
- Option B4: Use of biomass to generate heat and power at the project site

2. The implementation of the project activity not undertaken as a CDM project activity.

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

Both the above two alternatives are consistent with applicable laws and regulations:

- The applicable regulations do not restrict KCP SICL to continue steam and power generation using the lower efficiency pre-project system.
- The applicable regulations do not restrict KCP SICL to continue steam and power generation from bagasse or other biomass.
- Though the Ministry of Non-Conventional Energy Sources (MNES) aims to achieve 10% of installed power generation capacity from renewable sources, there is no mandate on any private entity to enhance power generation capacity from renewable sources.

The next step for additionality justification as per the Fig B.2 is either

- **Step 2 - Investment analysis (AND/OR)**
- **Step 3 - Barrier analysis**

B.5.3: Step 2 - Investment analysis

The economical attractiveness of the project activity in the normal circumstances (without CDM funds) is explored under this section.

Step 2.a: Determine appropriate analysis method

The "additionality tool" provides three options to do the investment analysis: Simple cost analysis, investment comparison analysis and benchmark analysis. As prescribed by the tool, the simple cost analysis is to be used only for projects that have no financial benefit other than CDM related income. For other

projects, either investment comparison analysis or benchmark analysis is to be used. The benchmark analysis option has been selected for the project activity.

Step 2.b: Benchmark analysis

The main criterion for a project to attract investment is its ability to pay for itself in a short period and make profits during its lifetime. Under the benchmark analysis, it is required to select the appropriate financial indicator and compare it with standard benchmarks available for similar projects. If the project's financial indicator is lower than the benchmark value, then the project is not economically viable for implementation. The internal rate of return (IRR) is chosen as the appropriate financial indicator for this project activity. Since KCP SICL is the only project promoter, *equity IRR* is considered as the suitable financial indicator for the project activity against *project IRR*. The sector specific and region specific benchmark equity IRR has been considered for comparison against the equity IRR of the project activity. The Andhra Pradesh Electricity Regulatory Commission (APERC) has considered a standard equity IRR of 16% while fixing the power purchase tariff for bagasse cogeneration projects. Since this benchmark is specific to the project sector and region, the same has been selected as the relevant benchmark for this project activity.

Step 2.c: Calculation and comparison of financial indicators

The equity IRR of the project activity has been calculated using standards and methods specific to the sector and region[1]. The comparison of the financial indicators is provided below:

Equity IRR of the project activity: 13.2 %

Benchmark equity IRR for similar project sector and region: 16 %

In the business as usual scenario, KCP SICL would not have opted to implement the project activity considering its poor financial viability. Consideration of revenue from the sale of carbon credits helped the IRR to increase above the minimum benchmark IRR and enabled KCP SICL to make the investment decision.

[1] Using assumptions as provided in APERC tariff order. Refer Annex 5 for details.

Step 2.d: Sensitivity analysis

The following sensitivity analysis provides the IRR for different scenarios with reasonable variations in parameters. The sensitivity analysis has been done for a combination of "+ or –" 10% variation in generation and "+ or –"10% variation in operation and maintenance expenses.

Sensitivity Analysis (% IRR)			
	Normal O&M	+10% O&M	-10% O&M
Normal Gen	13.2	12.9	13.4
+10% Gen	14.6	14.4	14.8
-10% Gen	11.7	11.5	11.9

It may be noted that the IRR does not reach the benchmark IRR value under any of the combination of scenarios and therefore the conclusion that the project activity is not economically viable is robust to reasonable variations.

The next step as per Figure B.2 is either Step 3 or Step 4.

B.5.4: Step 3 - Barrier analysis

Sub-step 3a: Identification of barriers that would prevent the implementation of the project activity

In the normal circumstances, the existence of significant prohibitive barriers to the project activity as discussed below would have deterred its implementation by KCP SICL.

Policy related barriers

The uncertainty of the returns from the project activity due to policy related risks resulted in KCPSICL being apprehensive of implementing the project (KCPSICL's apprehension is justified by the fact that the actual purchase tariff being realized is 5.8% lower than pre-project tariff).

The viability of non-conventional energy (NCE) power projects exporting to grid depends mainly on the purchase tariff of the distribution company (DISCOM). The DISCOM in this case is the state owned APSPDCL. The power purchase tariff of state DISCOMs are fixed by the respective state electricity regulatory boards, in this case, the Andhra Pradesh Electricity Regulatory Commission (APERC). Till March 2004, the purchase tariff was a single part rate of Rs.3.48 per unit and provided sufficient return on investment for the viable operation of biomass power plants. This encouraged industrialists to set up such

projects resulting in their significant growth during 2001 to 2003. However, in March 2004, the APERC reduced the purchase tariff to Rs.2.79 (for 2004-05) and restructured it to a two part tariff based on the fixed cost and variable cost of the project and linked it to the PLF (Plant Load Factor). The tariff revision reduced the profit margins and was a severe blow to the viability of biomass power projects in the state. KCP SICL's project activity was conceptualised during this period. Since the tariff revision, there has been a drastic drop in the growth of biomass based grid connected plants in the state of Andhra Pradesh. The following table provides data on growth of biomass power plants in A.P. for last four years:

Year	Installed capacity as on 31st March (MW)	Growth Rate (%)
2001-02	120.7	**Base Yr**
2002-03	225.7	**86.99**
2003-04	300.4	**33.10**
2004-05	313.4	**4.33**

Source: http://www.aptranscorp.com

The Biomass Energy Developers Association (BEDA) made several representations to APERC on tariff revision. With no consideration by APERC on the issue, the concerned investors have petitioned the government to take over their biomass power units and payback their investments. These developments have created a negative climate for new biomass power plants in the region since the purchase tariff is still prone to revision from time to time. However, KCP SICL has implemented this project activity considering that the additional CDM revenues would offset this policy risk and the financial loss resulting from any reduction in purchase tariff.

- **Additionality test for Regulatory/Legal requirements**

There is no legal or regulatory binding on KCP SICL imposed by national or regional laws to implement the project activity. The above tests and analysis suggest that the project activity is additional and the anthropogenic emissions of GHG by sources will be reduced below those that would have occurred in the absence of the registered CDM project activity.

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

The following demonstrates that the most likely alternative to the project activity (i.e. continuation of the pre-project system) doesn't face any of the barriers faced by the project activity:

Policy related barriers:

The policy related barrier does not impact the continuation of the pre-project configuration since there is no export of power involved in this scenario.

B.5.5: Step 4 - Common Practice Analysis

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

Only a minor percentage of the total power purchased by APSPDCL comes from cogeneration plants, therefore the KCP SICL project activity is not a common practice.

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

The operating parameters (days of operation, configuration etc) and investment climate of KCP SICL do not occur in other similar project activities and therefore this sub-step is not applicable.

B.5.6: Step 5 - Impact of CDM Registration

The prospect of additional income from the project activity through carbon revenues provided the promoters necessary incentive to implement it over and above the barriers. The carbon revenues serve to offset the project related risks and are vital for the sustainability of the project. The success of this CDM project activity will establish the viability of clean energy projects and help replication of renewable based power generation contributing directly to green house gas abatement. The promoters' confidence in clean development mechanism and the strong conviction that the project will accrue carbon revenues provided sufficient incentive to implement the project activity despite the risks and low financial returns. Consideration of revenue from the sale of carbon credits helped the project IRR to be robust enough to remain above the minimum benchmark IRR and enabled KCPSICL to make the investment decision. Being implemented as a CDM project, the carbon revenues are necessary to help offset the financial losses incurred due to lower tariff realization.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The emission reductions are mainly from the incremental energy generation using the same quantity of biomass that would been combusted in the baseline scenario. The incremental energy is exported to the grid and displaces equivalent CO_2 emission from grid connected power plants.

B.6.1.1 Project Emissions:

With reference to ACM0006, it is required to account CO_2 emissions from the combustion of fossil fuels used by the project activity (during unavailability of bagasse / drought / any other unforeseen circumstances) and that used for transportation of biomass from other sites to the project activity. Such emissions are calculated by using the below equations:

Carbon dioxide emissions from transportation of biomass to the project site (*PETy*):

$$PET_y = \frac{\sum BF_{i,y}}{TL_y} \times AVD_y \times EF_{Km,CO_2}$$

Where:

BFi,y is the quantity of biomass type i, transported from other sites and used as fuel in the project plant during the year *y* in a volume or mass unit,

TLy is the average truck load of the trucks used measured in tons of biomass,

AVDy is the average return trip distance between the biomass fuel supply sites and the site of the project plant in kilometers (km), and

EF_{Km,CO_2} is the average CO_2 emission factor for the trucks measured in tCO_2/km

Carbon dioxide emissions from on-site consumption of fossil fuels (*PEFFy*):

$$PEFF_y = \sum FF_{projectplant,i,y} \; x \; COEF_{co_2,i}$$

where,

$PEFF_y$ is the project emission from fossil fuel co-firing during the year y in tons of CO_2,

$FF_{projectplanti,y}$ is the quantity of fuel type i combusted due to the project activity during the year y in a volume or mass unit,

$COEF_{CO2,i}$ is the CO_2 emission factor of the fossil fuel type 'i' calculated as:

$COEF_{CO2,i} = 96.1 \times 0.98 \times NCV_i$

Where, 96.1 is the IPCC default emission factor for coal in tCO_2/TJ, 0.98 is the oxidation factor and NCV_i is the calorific value of the fossil fuel.

B.6.1.2 Baseline Emissions:

ACM0006 refers to calculation of baseline emission factor using ACM0002 ("Consolidated baseline methodology for grid connected electricity generation from renewable energy sources") estimated as under:

Baseline emissions due to displacement of electricity

For the displacement of electricity, the baseline scenario is the electricity that would have been generated by the operation of grid-connected power plants and by the addition of new generation sources, in the absence of the project activity.

Calculation of electricity baseline emission factor

As the power generation capacity of the biomass power plant is more than 15 MW, $EF_{electricity,y}$ should be calculated as a combined margin (CM), following the guidance in the section "Baselines" in the "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002).

STEP 1. Calculate the Operating Margin emission factor(s) ($EF_{OM,y}$) – Out of four methods mentioned in the ACM0002, Simple OM approach has been chosen for calculations since in the southern regional grid mix, the low-cost/must run resources constitute less than 50% of total grid generation. Simple OM factor is calculated as under.

$$EF_{OM,Simple,y} = \sum_{i,j} F_{i,j,y} \, x \, COEF_{i,j} / \sum_{j} GEN_{j,y}$$

where,

Fi ,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

COEFi,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, and

GENj,y - Is the electricity (MWh) delivered to the grid by source *j*

The CO_2 emission coefficient *COEFi* is obtained as

$$COEF_i = NCV_{i,} \, x \, EF_{CO2} x OXIDi$$

For calculations, local values of *NCVi* and $EFCO_{2i}$ have been used and a 3-year average based on the most recent statistics available at the time of PDD submission has been used for grid power generation data.

STEP 2. Calculate the Build Margin emission factor ($EF_{BM,y}$) as the generation-weighted average emission factor (tCO_2/MWh) of a sample of power plants *m* of southern regional grid, as follows:

$$EF_{BM,y} = \sum_{i,m} F_{i,m,y} \, x \, COEF_{i,m} / \sum_{j} GEN_{m,y}$$

where,

Fi,m,y, *COEFi,m* and *GENm,y* - Are analogous to the variables described for the simple OM method above for plants *m*.

Considered calculations for the Build Margin emission factor $EF_{BM,y}$ are *ex ante* based on the most recent information available on plants already built for sample group *m* of southern regional grid at the time of PDD submission. The sample group *m* consists of,

- The power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Further, power plant capacity additions registered as CDM project activities have been excluded from the sample group *m* of southern regional grid mix.

STEP 3. Calculate the electricity baseline emission factor *EFelectricity,y* as the weighted average of the Operating Margin emission factor (*EFOM,y*) and the Build Margin emission factor (*EFBM,y*):

$EF_y = w_{OM} . EF_{OM,y} + w_{BM} . EF_{BM,y}$

Where, the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$)

Determination of EG_y:

Where scenario 14 applies, *EGy* is determined based on the net efficiency of electricity generation in the project plant prior to project implementation $\varepsilon_{el,pre\ project}$ and the net efficiency of electricity generation in the project plant after project implementation $\varepsilon_{el,project\ plant,y}$, as follows:

$$EG_y = EG_{projectplant,y} \times \left(1 - \frac{\in_{el,preproject}}{\in_{el,project\ plant,y}}\right)$$

Where:

EG_y	- is the net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year *y* in MWh,
$EG_{project\ plant,y}$	- is the net quantity of electricity generated in the project plant during the year *y* in MWh,
$\varepsilon_{el,pre\ project}$	- is the net efficiency of electricity generation in the project plant prior to project implementation, expressed in MWhel/MWhbiomass
$\varepsilon_{el,project\ plant,y}$	-is average net energy efficiency of electricity generation in the project plant, expressed in MWhel/MWhbiomass.

B.6.1.3 Leakage:

ACM0006 states "The main potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion due to diversion of biomass from other uses to the project plant as a result of the project activity. Where the most likely baseline scenario is the use of the biomass for energy generation (scenarios 1, 4, 6, 8, 9, 11, 12, 13 and 14), the diversion of biomass to the project activity is already considered in the calculation of baseline reductions. In this case, leakage effects do not need to be addressed." The project activity falls under scenario 14 of ACM0006 and therefore does not require addressing leakage. There is no leakage of emission reductions.

B.6.1.4 Emission Reductions:

The emission reductions from the project activity are primarily the reduction in CO_2 emissions associated with grid power generation achieved through its substitution with biomass based power generation. The emission reduction *ERy* by the project activity during a given year *y* is the difference between the emission reductions from; the substitution of electricity generation with fossil fuels (*ERelectricity,y*), the emission reductions from the substitution of heat generation with fossil fuels (*ERheat,y*); and project emissions (*PEy*), emissions due to leakage (*Ly*), as follows:

Formula used for estimation of the total net emission reductions due to KCP SICL's project activity during a given year *y* is as under.

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

where,

ER_y - Are the net emissions reductions of the project activity during the year y in tons of CO_2

$ER_{heat,y}$ - Are the emission reductions due to displacement of heat during the year y in tons of CO_2

$ER_{electricity,y}$ - Are the emission reductions due to displacement of electricity during the year y in tons of CO_2

PE_y - Are the project emissions during the year y in tons of CO_2

L_y - Are the leakage of emission reductions during the year y in tons of CO_2

In this case (Scenario 14), $ER_{heat,y}$ and L_y are zero.

The project participant does not claim emission reductions for displacement of heat since the efficiency of heat generation remains the same after implementation of the project activity. Emission reductions from avoidance of emissions due to natural decay or uncontrolled burning do not apply to scenario 14.

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

Data / Parameter:	**$EG_{pre\text{-}project,y}$**
Data unit:	MWh
Description:	Electricity generation in the pre-project cogeneration configuration
Source of data used:	KCP SICL
Value applied:	2003: 4754.22 2004: 8178.80 2005: 7820.95
Justification of the choice of data or description of measurement methods and procedures actually applied :	Measured and recorded by KCP SICL using energy meters for the three pre-project years (2003-05)
Any comment:	This data is used for calculation of pre-project energy efficiency

Data / Parameter:	**$BF_{pre\text{-}project,y}$**
Data unit:	Tonnes
Description:	Quantity of biomass input to the cogeneration plant prior to the project activity
Source of data used:	KCP SICL
Value applied:	2003: 64312.5 2004: 122170.59 2005: 118385.78
Justification of the choice of data or description of measurement methods and procedures actually applied :	Monthly and annual mass and energy balance in the sugar plant supported by RT 8C forms submitted to the Government of India
Any comment:	This data is used for calculation of pre-project energy efficiency

Data / Parameter:	**$NCV_{BF,y}$**
Data unit:	Kcal/kg
Description:	Net Calorific value of fuel (biomass) used in the pre-project scenario
Source of data used:	KCP SICL
Value applied:	2270
Justification of the choice of data or description of measurement methods and procedures actually applied :	The NCV is determined from actual measurements

Any comment:	This data is used for calculation of pre-project energy efficiency

Data / Parameter:	$\mathbf{EF_{electricity}}$
Data unit:	tCO_2/MWh
Description:	Combined margin baseline emission factor of the southern regional grid
Source of data used:	CEA/IPCC
Value applied:	0.86
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per guidelines provided in ACM0002
Any comment:	More details in Annexure 3

Data / Parameter:	$\boldsymbol{\varepsilon_{el,pre\text{-}project}}$
Data unit:	$MWh_{el}/MWh_{biomass}$
Description:	Efficiency of electricity generation in the pre-project scenario
Source of data used:	KCP SICL
Value applied:	0.0262
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per guidelines provided in ACM0006
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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The following tables show the calculation of emission reductions using the formula mentioned in section B.6.1.

Project emissions:

Emissions due to combustion of fossil fuels in the project activity:					
S.No	**Notation**	**Parameter**	**Unit**	**Value**	**Comments**
1	$FF_{project\ plant,y}$	Quantity of coal used	T/yr	0	Will be measured if used. Envisaged only during emergencies.
2	NCV	Calorific Value	TJ/T coal	0	Will be measured if used. Envisaged only during emergencies.
3	EF_{CO2}	CO2 emission factor	tCO_2/TJ	96.1	IPCC default value
4	OXID	Oxidation factor		0.98	IPCC default value
5	COEF (2*3*5)	CO2 emission factor	tCO_2/T coal	0	Methodology formula
6	$PEFF_y$ (1*5)	CO2 emissions from coal	tCO_2/yr	0	Methodology formula

Emissions due to combustion of fossil fuels for transportation of biomass:					
7	BF_y	Quantity of biomass bought and transported from outside for off-season operation	T	0	Not expected
8	TL_y	Average truck load of the trucks used	T	0	Not expected
9	AVD_y	Average return trip distance between the biomass fuel supply sites and the project plant	kms	100	Conservative assumption. ACM0006 prescribes a minimum value of 20 kms.
10		Fuel consumption per 1000 kilometer	kg/000'kms	205	Local data
11		CO2 emission	kgCO2/kg	3.16	IPCC default value

		factor	fuel		
12	$EF_{km,CO2}$ (10*11)	Average CO2 emission factor of the trucks	kgCO2/km	0.6478	Methodology formula
13	PET_y ((7*9*12) / (8))	CO2 emissions from diesel	tCO2	0	Methodology formula
14	PE_y (6+13)	Total Project Emissions	tCO2	0	Methodology formula

Leakage:
As per ACM0006, for project activities under scenario 14, leakage is already considered in the baseline calculations and need not be separately addressed.

Baseline emissions:

Determination of EGy:					
S.No	**Notation**	**Parameter**	**Unit**	**Value**	**Comments**
1	EGpre-project,y	Generation from the pre-project system in three pre-project years	MWhe	**2003:** 4754.22 **2004:** 8178.80 **2005:** 7820.95	Actual values recorded by KCP SICL
2	EGproject plant,y	Generation from the project plant	MWhe	11656	Based on 100 days operation during the crushing season
3	BFpre-project,y	Fuel Consumption (Pre-project system)	T	**2003:** 64312.54 **2004:** 122170.59 **2005:** 118385.78	Actual values recorded by KCP SICL
4	BFpre-project,y	Fuel Consumption in heat equivalent	$MWh_{biomass}$	**2003:** 169591.09 **2004:** 322161.80 **2005:** 312181.32	
5	BFproject plant,y	Fuel Consumption (Project system)	T	97200	Expected bagasse availability based on 100 days operation of the sugar plant
6	BFproject plant,y	Fuel Consumption in heat equivalent	$MWh_{biomass}$	219500	Based on historic calorific value of

					bagasse
7	$\varepsilon_{el,\ pre\text{-}project}$ (1/4)	Pre-project efficiency	MWh_{el} / $MWh_{biomass}$	0.0262	Average efficiency achieved during the three pre-project years
8	$\varepsilon_{el,\ project\ plant,y}$ (2/6)	Project plant efficiency	MWh_{el} / $MWh_{biomass}$	0.0455	Based on actual observed data
9	EGy (2* (1- (7/8)))	Incremental Energy generation from the project activity	MWh	5148.9	ACM0006 formula

S.No	Notation	Parameter	Unit	Value
10	EG_y	Incremental Energy generation from the project activity	MWhe/yr	5148.9
11	$EF_{electricity}$	Baseline emission factor for grid	tCO_2/MWh	0.86
12	BE_y (10*11)	Baseline emissions	tCO_2/yr	4428

Emission reductions

S.No	Notation	Parameter	Unit	Value
1	BE_y	Baseline emissions	tCO_2/yr	4428
2	PE_y	Project emissions	tCO_2/yr	0
3	L_y	Leakage	tCO_2/yr	0
3	ER_y (1-2-3)	Emission reductions	tCO_2/yr	4428

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

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Sr. No.	Operating Years	Baseline Emission Factor (tonnes of CO_2 / MWh) EFy	Incremental electricity generation (MWh) EGy	Baseline Emissions (tonnes of CO_2) BEy	Project Emissions (tonnes of CO_2) PEy	Certified Emission Reductions - CERs (tonnes of CO_2)
1.	2007-08	0.86	5148.9	4428	0	4428
2.	2008-09	0.86	5148.9	4428	0	4428
3.	2009-10	0.86	5148.9	4428	0	4428
4.	2010-11	0.86	5148.9	4428	0	4428
5.	2011-12	0.86	5148.9	4428	0	4428
6.	2012-13	0.86	5148.9	4428	0	4428
7.	2013-14	0.86	5148.9	4428	0	4428
8.	2014-15	0.86	5148.9	4428	0	4428
9.	2015-16	0.86	5148.9	4428	0	4428
10.	2016-17	0.86	5148.9	4428	0	4428
	2007-2017		**51489**	**44280**	**0**	**44280**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**AVD_y**
Data unit:	Kilometres (Kms)
Description:	Average return trip distance between biomass fuel supply sites and the project site
Source of data to be used:	Truck operator
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100
Description of measurement methods and procedures to be applied:	The truck operator will provide the distance travelled by the truck between the fuel supply site
QA/QC procedures to be applied:	Consistency of distance records provided by the truckers will be checked by comparing recorded distances with information from other sources
Any comment:	This data is used to calculate project emissions from biomass transportation

Data / Parameter:	**TL_y**
Data unit:	Tonnes
Description:	Average truck load of the trucks used for transportation of biomass
Source of data to be used:	KCP SICL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10
Description of measurement methods and procedures to be applied:	Average carrying capacity of trucks
QA/QC procedures to be applied:	Weigh bridges used for measuring the truck loads will be calibrated periodically
Any comment:	This data is used to calculate project emissions from biomass transportation

Data / Parameter:	**$EF_{km, CO2}$**
Data unit:	t CO_2/km
Description:	Average CO_2 emission factor for transportation of biomass with trucks

Source of data to be used:	IPCC and Truck operator
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.6478
Description of measurement methods and procedures to be applied:	Data from the truck operators
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	Local or national data will be used. Default values from the IPCC will be used alternatively and chosen in a conservative manner.

Data / Parameter:	$\mathbf{FF_{project\ plant\ i,y}}$
Data unit:	Tonnes
Description:	Onsite fossil fuel consumption of type 'i' for co-firing in the project plant
Source of data to be used:	KCP SICL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	The quantity of fossil fuel is measured at the weigh bridge before their unloading into the project site.
QA/QC procedures to be applied:	The consistency of metered fuel consumption quantities will be checked with purchase receipts
Any comment:	

Data / Parameter:	$\mathbf{NCV_{i,FF}}$
Data unit:	Kcal/kg
Description:	Calorific value of fossil fuel
Source of data to be used:	KCP SICL
Value of data applied for the purpose of	0

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The NCV is determined in calibrated calorimeters of a certified agency
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	The value will be determined when fossil fuel is used

Data / Parameter:	**$COEF_{CO2, i}$**
Data unit:	tCO_2/t of fuel
Description:	CO_2 emission factor for fuel type i
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Calculated using formula provided in ACM0006. Refer B.6.1.
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	Local values / IPCC Guidelines/Good Practice

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Net quantity of Electricity supplied to the grid by the project
Source of data to be used:	KCP SICL / APSPDCL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5148.9
Description of measurement methods and procedures to be applied:	Calibrated energy meters of KCP SICL and APSPDCL Frequency: Daily in KCP SICL meters and monthly in APSPDCL meters

QA/QC procedures to be applied:	The consistency of metered net electricity generation will be cross-checked with receipts from sales (if available) and the quantity of biomass fired (e.g. check whether the electricity generation divided by the quantity of biomass fired results in a reasonable efficiency that is comparable to previous years)
Any comment:	Reference to ACM0002. Electricity supplied by the project activity to the grid. Double check by receipt of sales.

Data / Parameter:	**$EG_{project\ plant,y}$**
Data unit:	MWh
Description:	Net quantity of electricity generated in the project plant during the year y
Source of data to be used:	KCP SICL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	11656
Description of measurement methods and procedures to be applied:	Calibrated energy meters of KCP SICL Frequency: Daily in KCP SICL meters
QA/QC procedures to be applied:	The consistency of metered net electricity generation will be cross-checked with receipts from sales (if available) and the quantity of biomass fired (e.g. check whether the electricity generation divided by the quantity of biomass fired results in a reasonable efficiency that is comparable to previous years)
Any comment:	

Data / Parameter:	**$BF_{i,y}$**
Data unit:	Tonnes
Description:	Quantity of biomass type *i* combusted in the project plant during year y
Source of data to be used:	KCP SICL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	97200
Description of measurement methods and procedures to be applied:	Monthly and annual mass and energy balance in the sugar plant supported by RT 8C forms submitted to the Government of India
QA/QC procedures to be applied:	Any direct measurements with mass or volume meters at the plant site will be cross-checked with annual energy balance that is based on fuel generated in-house, purchased quantities and stock exchanges
Any comment:	

Data / Parameter:	$NCV_{i,BF}$
Data unit:	Kcal/kg
Description:	Net calorific value of biomass
Source of data to be used:	KCP SICL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2270
Description of measurement methods and procedures to be applied:	The NCV is determined in calibrated calorimeters of a certified agency
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	

Data / Parameter:	$\varepsilon_{el,project\ plant,y}$
Data unit:	MWh electricity per MWh heat input
Description:	Average net energy efficiency of electricity generation in the project plant
Source of data to be used:	KCP SICL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0455
Description of measurement methods and procedures to be applied:	Calculated using formula provided in ACM0006 based on estimated electricity generation and fuel consumption
QA/QC procedures to be applied:	Check consistency with manufacturer's information or the efficiency of comparable plants.
Any comment:	

B.7.2 Description of the monitoring plan:

>>

KCP SICL will incorporate a special team for implementing the monitoring procedures as described in sections B6.2 and B7.1. The team will comprise of relevant personnel from various departments, who will

be assigned the task of monitoring and recording specific CDM parameters relevant to their department. The monitored values will be periodically cross-checked by the respective department heads and sent to the CDM team head for compilation and analysis. Any deviation of monitored values from estimated values will be investigated and appropriate action would be taken. The monitored values would be recorded and stored in paper and electronically for verification. Elaborate monitoring information is provided in Annexure 4.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>

23/04/2007

KCP Sugar and Industries Corporation Limited

239, Anna Salai, Ramakrishna Buildings,

Chennai – 600 006

The entity is a project participant listed in Annex I.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
16/11/2004

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

>>
20 years 0 months

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

The project proponent wishes to go for a fixed crediting period of ten years

C.2.1. Renewable crediting period

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

>>
Not Applicable

C.2.1.2. Length of the first crediting period:

>>
Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/07/2007 or Upon Registration with UNFCCC

C.2.2.2. Length:

>>
10 years 0 months

SECTION D. Environmental impacts

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

>>

The government of India (host party) doesn't require an analysis of the environmental impacts for project activities of such investment level as the project activity. A summary of the environmental performance of the project activity is described below:

S.no	DESCRIPTION	Status	REMARKS
1	Trade wastewater	The effluent is being treated in ETP and used for filter cake treatment so as to produce enriched compost and if any excess available will be discharged.	The treated effluent standards are well within the limits
2	Air emissions	1. Air pollution controlling system available 2. Stack height is 30 mts	The emissions are within the limits of APPCB
3	Solid waste storage and disposal	Filter cake is disposed to farmers as "Bio-compost" Ash is given to brick manufacturers and part of it is used for laying roads	Generates revenue. They are handled and disposed off properly
4	Hazardous waste	Waste oil is being used for applying on chains	None
5	Consent for operation (air and water)	Obtained and is valid.	None
6	Ambient air quality	Good	The ambient air quality is meeting the standards
7	Noise levels	Necessary action has been taken to reduce the noise levels	Noise levels are well within the limits.
8	Green belt area	Existing and is being developed rapidly in the adjacent areas too	Good
9	Odour	No odour generating sources available	None

10	Empty containers or waste oil, chemicals	Stored properly	None
11	Chemical storage area	In good condition	None
12	Soil conditions	Good and no signs of contamination	Good
13	House keeping	Good	None
14	Work force	Trained for environmental and safety awareness	None

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

There is no significant negative environmental impact as a result of the project activity. The government of India (host party) doesn't require an analysis of the environmental impacts for project activities of such investment level as the project activity.

SECTION E. Stakeholders' comments

>>

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

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In view of appraising the local stakeholders about their CDM project activity, KCP SICL had formally invited them for a stakeholder consultation process (on 23/12/2005) at the project site and held discussions on the same. The stakeholders invited for the meeting are detailed below:

1. Elected body of representatives administering the local area
2. Transmission Corporation of Andhra Pradesh (APTRANSCO)
3. Andhra Pradesh Pollution Control Board (APPCB)
4. Consultants
5. Equipment Suppliers
6. Non Governmental Organisations

The stakeholders actively participated in the discussions on the CDM project activity and provided their views on the same. Documents on the stakeholder consultation process are available at the project site.

E.2. Summary of the comments received:

>>

KCP SICL had received the required approvals and consents from various authorities required for project implementation. The power purchase agreement with the off taker of power has already been entered into. All the stakeholders who attended the meeting had encouraged the upcoming of the project activity and commended the initiatives of KCP SICL in developing their project activity under the Clean Development Mechanism of the United Nations Framework Convention on Climate Change. To sum up, all the comments were positive and encouraging and no negative comments were received.

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

>>

As there were no negative comments, no corrective action was to be made. As per UNFCCC requirement, the Project Design Document will be published at the validating DOE's web site for public comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	KCP Sugar and Industries Corporation Ltd
Street/P.O.Box:	239, Anna Salai
Building:	Ramakrishna Buildings
City:	Chennai
State/Region:	Tamil Nadu
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E-Mail:	kcpsugar@vsnl.com
URL:	
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	B.R
Middle Name:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I parties for this project activity

Annex 3

BASELINE INFORMATION

The Central Electricity Authority (CEA) has published the baseline emission factors database for the various electricity grids in India. The emission factors have been calculated based on UNFCCC guidelines (ACM0002). For further details on the calculation methods and data used, please refer the following weblink:

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

In the CEA database, the simple operating margin, build margin and combined margin emission factors of the regional electricity grids have been provided separately for two cases; Including electricity imports and Excluding electricity imports from other regional grids. Since, emission factors excluding imports are lower, the same has been considered as a conservative approach. The combined margin emission factor for the southern regional grid (0.86 tCO_2/MWh) has been considered for this project activity.

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE

VERSION	**1.1**
DATE	**21 Dec 2006**
BASELINE METHODOLOGY	**ACM0002 / Ver 06**

EMISSION FACTORS

Simple Operating Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05
North	0.98	0.98	1.00	0.99	0.97
East	1.22	1.22	1.20	1.23	1.20
South	1.02	1.00	1.00	1.01	1.00
West	0.98	1.01	0.98	0.99	1.01
North-East	0.67	0.66	0.68	0.62	0.66
India	1.02	1.02	1.02	1.03	1.03

Build Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05
North					0.53
East					0.90
South					0.72
West					0.78
North-East					0.10
India					0.70

Combined Margin (tCO2/MWh)

(excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05
North	0.76	0.76	0.77	0.76	0.75
East	1.06	1.06	1.05	1.07	1.05
South	0.87	0.86	0.86	0.86	0.86
West	0.88	0.89	0.88	0.88	0.90
North-East	0.39	0.38	0.39	0.36	0.38
India	0.86	0.86	0.86	0.86	0.86

Annex 4

MONITORING INFORMATION

KCP SICL has employed the latest and state of the art monitoring system and equipment to measure, record and report the various key CDM parameters. Monitoring methods have been designed and implemented for all the parameters (in Sections B.6.2 and B.7.1) required to calculate emission reductions and project emissions.

CDM Team:

The CDM team comprises of personnel from the Mechanical, Electrical, Instrumentation, Laboratory and Systems departments. The personnel in the team perform the dual functions of power plant O&M and compliance with CDM procedures.

Functions of the CDM Team:

- Monitor parameters for calculating emission reductions generated by the project activity
- Maintain records of relevant data for verification of CERs.
- Ensure accuracy of data by proper maintenance and calibration of monitoring equipment.
- Operate the power plant in compliance with the CDM Project Design Document
- Take all preventive measures to ensure plant availability at all times.

Responsibilities under CDM:

CDM responsibilities of mechanical department:

- The team will verify availability of sufficient bagasse/biomass stock to meet the power plant's requirement
- The team will verify, compile and send a daily report of steam generated, energy generated, auxiliary consumption, captive consumption and energy exported to the cogeneration plant head
- The team shall co-ordinate with the laboratory team and inform them of incoming biomass to arrange for its weighing and sampling

CDM responsibilities of the Electrical department:

- The team will prepare a monthly power and fuel report and send it to the cogeneration plant head

- The team will ensure on a daily basis that all energy meters are functioning properly and that data is recorded.
- The team will cross-check the plant energy meter with that of the Electricity utility's meter on a monthly basis.
- The team will arrange for the calibration and certification of energy meters when there is a significant deviation from the utility meter or on a periodic basis.

CDM responsibilities of the Laboratory-in-charge:

- The team will collect samples of fuel and arrange for its analysis.
- The results of the same will be sent to the cogeneration plant head.

CDM responsibilities of the stores department:

- The team will monitor and measure the incoming fuel quantity and distance travelled by the truck used.
- A summary of the total quantity of fuel purchased is sent to the cogeneration plant head every month.

CDM responsibilities of the cogeneration plant head / CDM coordinator:

- The cogeneration plant head will ensure that all CDM related parameters are monitored.
- Receives report of CDM parameters from the mechanical, electrical, stores and lab-in-charge, compiles the same to calculate the CERs generated and reports it to the General Manager.
- Stores the reports for CDM Verification
- Reviews and guides the departments in terms of their functions related to CDM
- Prepares a monitoring report at the end of the year to be submitted to the verification agency.

CDM committee meeting:

The committee will meet once a month to review the CDM performance of the plant. The CERs generated are compared with the expected CERs and corrective actions are taken.

Annex 5

BASIS OF FINANCIAL PROJECTIONS	
DESCRIPTION	**Rs. In Lakhs**
INSTALLED PROJECT COST	465.00
INTERNAL ACCRUALS	465.00
TERM LOAN FROM FINANCIAL INSTITUTION	0.00
FINANCIAL ASSISTANCE FROM SUGAR DEVELOPMENT FUND	0.00
PARTICULARS	**Value**
NO. OF DAYS OF OPERATION OF THE PLANT	100
NET SALABLE POWER QUANTITY (KW)	2200
NET SALABLE POWER QUANTITY PER SEASON IN kWhs	
BELOW 55% PLF	2904000
ABOVE 55% PLF	1320000
SALE PRICE OF ENERGY/kWh	
BELOW 55% PLF	2.790
ABOVE 55% PLF	1.285

REPAIRS AND MAINTENANCE (Rs. IN LAKHS) 2% ON PROJECT COST	8.74
ANNUAL ESCALATION OF REPAIRS AND MAINTENANCE IN %	4.00
SALARIES AND WAGES (Rs. IN LAKHS)	3.60
ANNUAL ESCALATION OF SALARIES AND WAGES IN %	10.00
ADMINISTRATIVE EXPENSES (RS. IN LAKHS)	2.00
ANNUAL ESCALATION OF ADMINISTRATIVE EXPENSES IN %	5.00
INSURANCE ON FACTORY ASSETS @ 1% ON PROJECT COST	4.37
RATE OF DEPRECIATION AS PER COMPANY LAW	
BUILDINGS AND CIVIL WORKS	3.34%
PLANT AND MACHINERY AND MISCELLANEOUS ASSETS	5.28%
RATE OF DEPRECIATION FOR INCOME TAX COMPUTATION	
BUILDINGS AND CIVIL WORKS	10%
PLANT AND MACHINERY AND MISCELLANEOUS ASSETS	80%

Appendix 1

LIST OF REFERENCES

- APSERC order on tariff for power purchase from non-conventional energy power plants - http://www.ercap.org/OtherOrders/Orders.html
- **http://www.vijayawadacity.com/do.php?name=Information&ino=18**
- www.unfccc.int
- APERC dismissal of BEDA's review petition on the new power purchase tariff order - http://www.ercap.org/OtherOrders/Orders.html
- Status of biomass power plants in A.P. - http://www.electricityforum.com/news/mar04/biomass.html
- APTRANSCO "Performance and Statistics" data providing installed capacity of biomass power plants in the last 4 years – www.aptranscorp.com
- CEA Monthly Power sector reports- http://www.cea.nic.in/power_sec_reports/executive_summary/2005_12/6.pdf
- MNES study report titled "Baselines for Renewable Energy Projects under Clean Development Mechanism": Chapter 2 - http://mnes.nic.in/baselinerpt.htm
- MNES Annual report 2004-05- http://www.mnes.nic.in/annualreport/2004_2005_English/ch2_pg1.htm
- Emission reduction calculations
- Project financial data with assumptions
- www.envfor.nic.in
- www.mnes.nic.in
- www.cea.nic.in
- Power purchase agreement with APTRANSCO/APSPDCL
- Purchase order for turbo generator
- Detailed Project Report
- Consent order for operation of the power plant from APPCB
- ISMA data on cane output fluctuation - – www.indiansugar.com
- Letters of consent from stakeholders

- Benchmark IRR: APERC Tariff order - http://www.ercap.org/OtherOrders/Orders.html

Appendix 2

ABBREVIATIONS

A.P.	Andhra Pradesh
APERC	Andhra Pradesh Electricity Regulatory Commission
APPCB	Andhra Pradesh State Pollution Control Board
APSPDCL	Southern Power Distribution Corporation of Andhra Pradesh Limited
APTRANSCO	Andhra Pradesh Transmission Corporation Limited
BAU	Business As Usual
BEDA	Biomass Energy Developers Association
BEF	Baseline Emission Factor
BM	Build Margin
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CEA	Central Electricity Authority
CM	Combined Margin
CO_2	Carbon Dioxide
CO2e	Carbon-di-Oxide equivalent
COEF	Carbon dioxide emission factor
DCS	Distributed Control System
DPR	Detailed Project Report
EB	Executive Board
EMP	Environmental Management Plan
ER	Emission Reductions
GHG	Green House Gas
INR	Indian National Rupee
IRR	Internal Rate of Return
kCal	kilo Calories
KCP SICL	KCP Sugar and Industries Corporation Limited
Kg	kilo gram
kV	kilo Volts
kWh	kiloWatt hour
L.T.	Low Tension
M	Metre
M&V	Monitoring and Verification
Mm	Millimeter

MNES	Ministry of Nonconventional Energy Sources
MoEF	Ministry of Environment and Forests
MT	Metric Tonne
MU	Million Units
MW	Mega Watts of power
MWh	MegaWatt hour
NCE	Non Conventional Energy
NEDCAP	Non conventional Energy Development Corporation of Andhra Pradesh
OM	Operating Margin
PCN	Project Concept Note
PDD	Project Design Document
T&D	Transmission and Distribution
TCD	Tonnes of Cane per Day
tCO2e	Tonnes of Carbon Dioxide Equivalent
TG	Turbo Generator
TPH	Tonnes Per Hour
UNFCCC	United Nations Framework Convention on Climate Change