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

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SECTION A. General description of project activity

A.1 Title of the project activity:

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"Surplus power generation for grid" at Vayyuru, Andhra Pradesh

Version 04

10/04/2008

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A.2. Description of the project activity:

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Purpose

The primary objective of the project activity is to export clean power to the grid and essentially reduce greenhouse gas emissions. The electric power exported by the project activity is generated out of bagasse resulting from sugar manufacture. The project activity is located at the Vuyyuru[1] sugar factory premises of KCP Sugar and Industries Corporation Limited. After meeting the captive and auxiliary power requirements, the excess power is exported to the grid of Southern Power Distribution Company of A.P. Limited (APSPDCL). Apart from helping in bridging the gap between demand and supply of electricity, bagasse based power generation offers environment friendly solutions like additional power generation, conserving fossil fuels, capacity building and socio-economic growth and development of surrounding areas.

KCP SICL at Vuyyuru is one among the largest sugar manufacturers in India. The project promoters being progressive and environmentally concerned have taken a forward step in developing this project under the Clean Development Mechanism (CDM) of United Nations Framework Convention on Climate Change (UNFCCC).

This project activity exports surplus power to the grid, after meeting captive and auxiliary power requirements. The project activity is expected to operate around 140 days per year (during season) and will export approximately 18 Million kWhs of electric power per annum to the APSPDCL.

Contribution to Sustainable Development

The project contributes to sustainable development of India in the following ways:

- Supplements the grid with eco-friendly clean power
- Helps in greenhouse gas abatement, mainly carbon dioxide
- Demonstrates viability of grid connected electricity generation through renewables

[1] Vuyyuru is also spelt as Vayyuru

- Reduces (marginally) the demand for electricity in the state
- Employment generation in the vicinity of the project activity
- Effective utilization of bagasse
- Conserves environment and fossil fuels, making them available for other purposes

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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Vuyyuru village, 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 Survey No. 628, Bandar road , Vuyyuru village, Krishna District in the Indian state of Andhra Pradesh. The district got its name after the mighty river Krishna, flowing through it. The project activity lies at latitude 16^{o} 22' North and longitude 80^{o} 50' East and is about 100m above the mean sea level. The nearest railway station and airport are at Vijayawada which is around 40 kms from the project site. The average rainfall in this area is approximately around 965mm and the temperatures range between 18 and 45 degree centigrade.

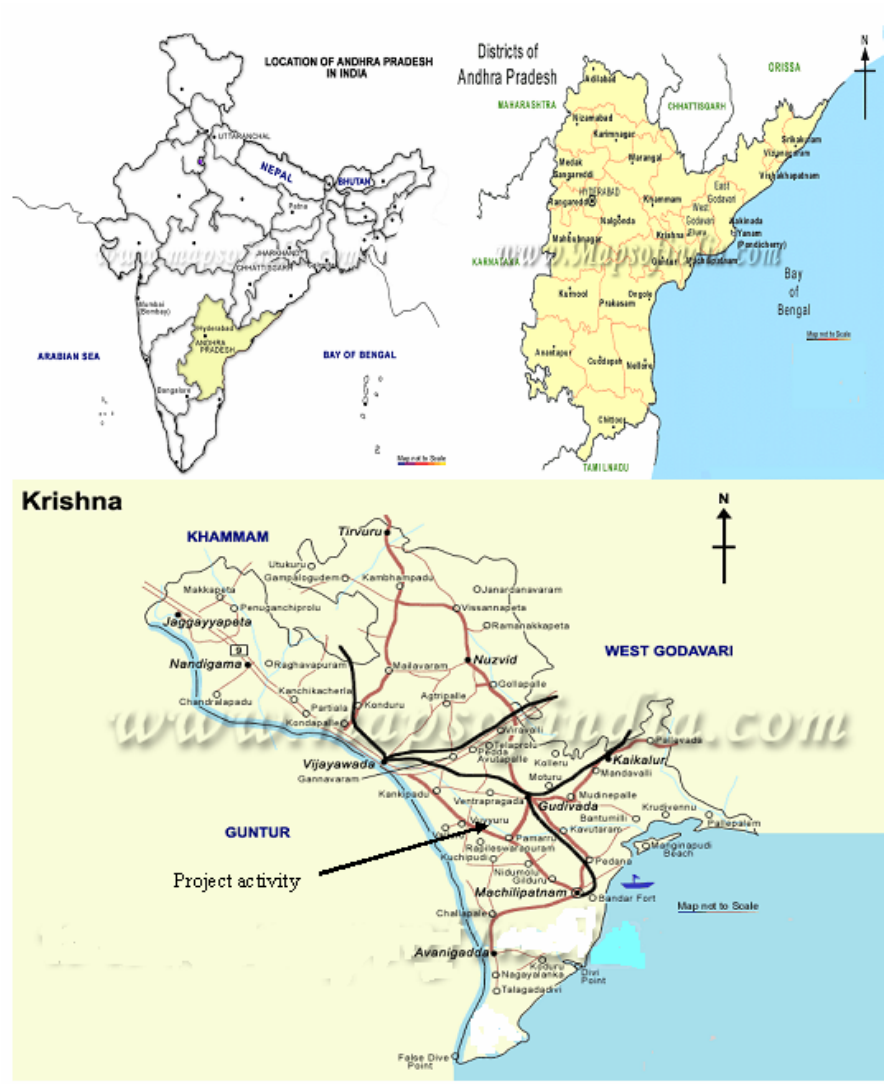

Figure A.1: Project location

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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In the pre-project scenario, KCP SICL had a 10MW cogeneration system based on biomass fuel (bagasse) to cater the energy demands of the sugar factory, with no export to the grid. During year 2001-02, KCP SICL planned to install a 20 MW grid connected cogeneration system. Subsequently, applications for obtaining statutory clearances for setting up the 20 MW system were submitted to various agencies. However, due to a downturn in the sugar industry during the year and uncertainties in the power purchase policy[2], KCP SICL decided to defer the project implementation. In year 2003-04, the revised power purchase policy was declared and the sugar industry also showed an improvement. After this, KCP SICL re-examined the proposal of the 20 MW cogeneration system. Considering the reduced power purchase tariff and the difficulty in arranging the huge capital investment required for the 20 MW system, KCP SICL decided to downsize the project to a 12 MW grid connected system and implement it as phase 1 of the 20 MW grid connected cogeneration system. The remaining 8 MW is planned to be implemented at a later stage as a separate project[3] (phase 2) depending on its feasibility.

Along with the phase 1 (12 MW grid connected system), the company also has included the installation of a new higher efficiency TG of 3 MW capacity for captive purposes.

The CDM project activity involves the following components:

[2] The power purchase policy was expiring in March 2004 subsequent to which a revision of the tariff was expected

[3] The phase 2 will be implemented as a separate project activity without interfering with the boundary of the proposed CDM project activity. Any impact due to the phase 2 on the project boundary of this project activity would be informed to the CDM EB and appropriate action as required would be taken at that time.

- Installation of a 43 ATA high pressure 12 MW grid connected TG set.
- Installation of a 43 ATA high pressure 3 MW captive TG set.
- Revamping of the existing 2 X 100 TPH boilers to operate at 43 ATA pressure. These boilers were earlier operating at 21.5 ATA to cater the 5 Nos. low pressure TG sets.
- Dismantling of the 5 Nos. low pressure TG sets of total capacity 10 MW.

To summarize, the project consisted of replacing the existing low pressure TG sets of 10 MW capacity with a 12 MW grid connected high pressure TG set and a 3 MW captive high pressure TG set (total 15 MW capacity).

A feasibility study for the 15 MW system was conducted in September 2004 and thereafter KCP SICL decided to implement the project activity under the CDM to overcome the investment and other policy barriers as described in section B.5.

Project activity at KCP SICL is enhancement of the cogeneration plant from 10 MW to 15 MW by up gradation of the system (i.e increase in cogeneration system capacity by 5MW) and export of surplus electricity generated to the APSPDCL grid. The higher pressure configuration is more efficient and is able to generate more power for the same quantity of heat input. The existing boilers have been upgraded to generate high pressure steam to meet the requirements of new TGs. Figures A.1 and A.2 illustrate the pre-project and post project scenarios in detail.

The project activity supplements the Southern Power Distribution Company of A.P Limited (APSPDCL) grid with approximately 18 Million kWhs of electric power. The entire fuel (bagasse) requirement of the project activity is met out of in-house generated bagasse[4] and satisfies the fuel requirements of the system. Steam extracted from the turbo generator is utilized for process requirements. Exhaust steam condensate from sugar plant process and condensate from turbine surface condenser will be used as feed water for boilers. The cycle makeup water for the operation of the plant will be mostly de-mineralised water, with occasional use of good quality vapour condensate. The project activity is equipped with the best of control system (DCS), bagasse handling, ash handling, effluent treatment plant, feed water system and all other necessary ancillary systems. Transformers, Switchyard and power evacuation systems are in place to step up the generated power to 33KV level and export it to the substation, which is closely located near the project site. The project activity is expected to operate around one hundred and forty days a year (during season) and export approximately 18 Million kWhs of power to the APSPDCL grid after meeting the captive and auxiliary requirements. The power is exported to the Vuyyuru substation which is

[4] Minor quantity (around 1%) of cane trash (in-house biomass residue) is also used.

just half a kilometer away from the project site. The seasonal power export to the APSPDCL grid from this project would be about 18 Million kWhs. 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.

The project team has been trained by the equipment suppliers in the operation and maintenance of the higher pressure system.

Figure A.2: Pre-project scenario

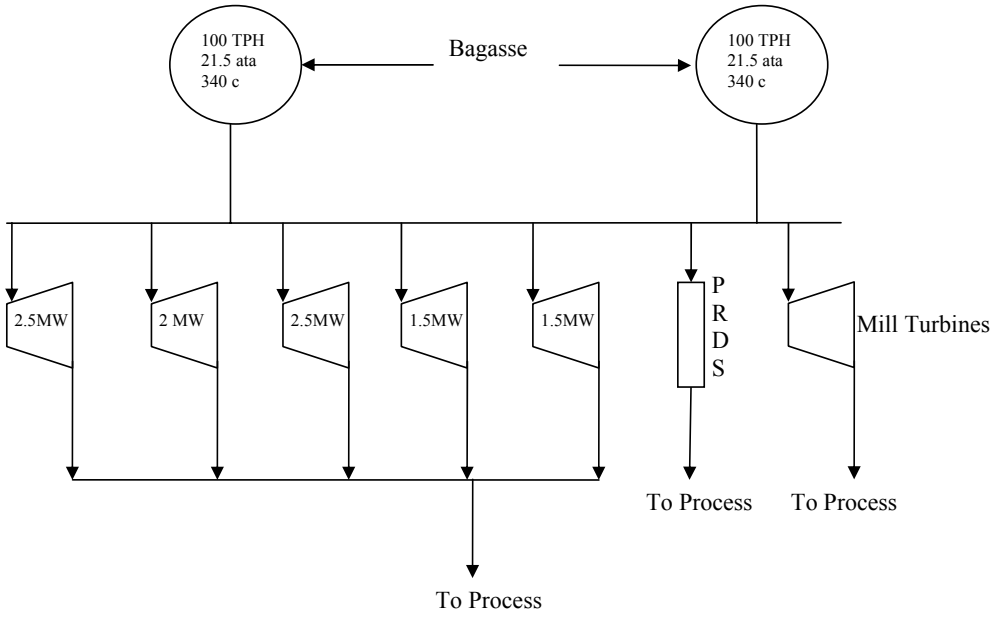
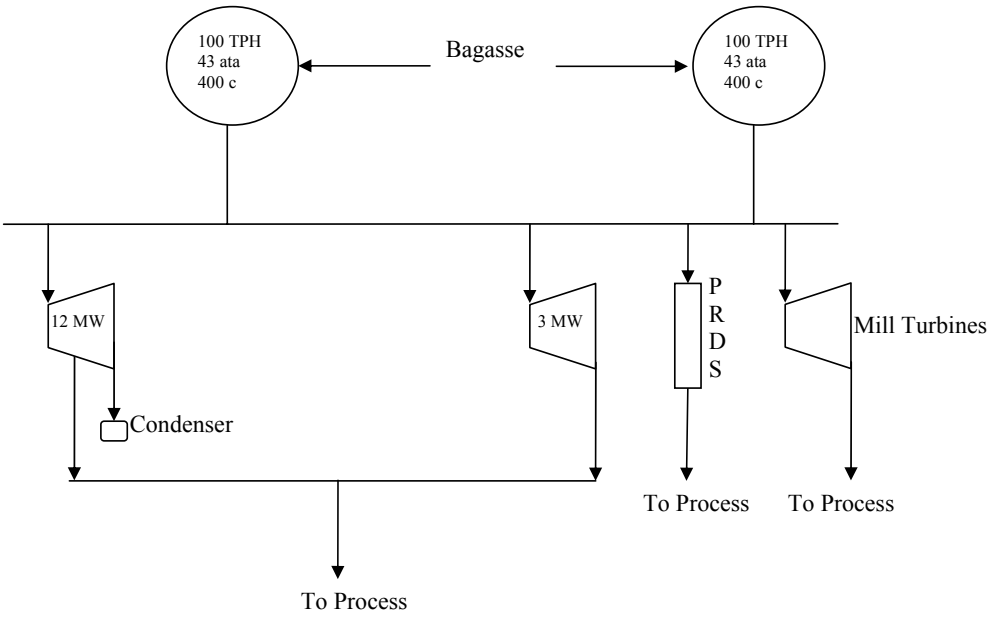


Figure A.3: Post project scenario



GHG Emission reduction:

The business as usual scenario for KCP SICL would have been the continuation of the low pressure low efficiency system. The implementation of the project activity increases the efficiency of electricity generation and therefore results in incremental energy generation from the same quantity of biomass residues. This incremental surplus electricity is exported by KCP SICL to the southern regional grid. The exported electricity displaces an equivalent quantity of electricity that would otherwise be generated in the fossil fuel intensive power plants connected to the southern regional grid. Thus the project activity reduces the electricity generation from grid connected fossil fuel intensive power plants and therefore results in reduction of CO_2 emissions. In the absence of the project activity, there would not be any surplus power export to the grid from KCP SICL and therefore no GHG emission reductions.

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
December 2007 - November 2008	15,547
Dec 2008 - Nov 2009	15,547
Dec 2009 - Nov 2010	15,547
Dec 2010 - Nov 2011	15,547
Dec 2011 - Nov 2012	15,547
Dec 2012 - Nov 2013	15,547
Dec 2013 - Nov 2014	15,547
Dec 2014 - Nov 2015	15,547
Dec 2015 - Nov 2016	15,547
Dec 2016 - Nov 2017	15,547
Total estimated reductions (Tonnes of CO_2e)	**155,470**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	15,547

A.4.5. Public funding of the project activity:

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There is no public funding for this project activity from Annex I parties to the Kyoto Protocol

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 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" version 03.*

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 version 04, 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). Negligible amount of cane trash, which is also a biomass residue, is also used.
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 biomass residues for fuel combustion	The preparation of bagasse doesn't involve significant energy consumption.

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 spatial extent of the project boundary encompasses:

- The power plant at the project site
- The means for transportation of biomass residues to project site
- All power plants connected to the electricity grid

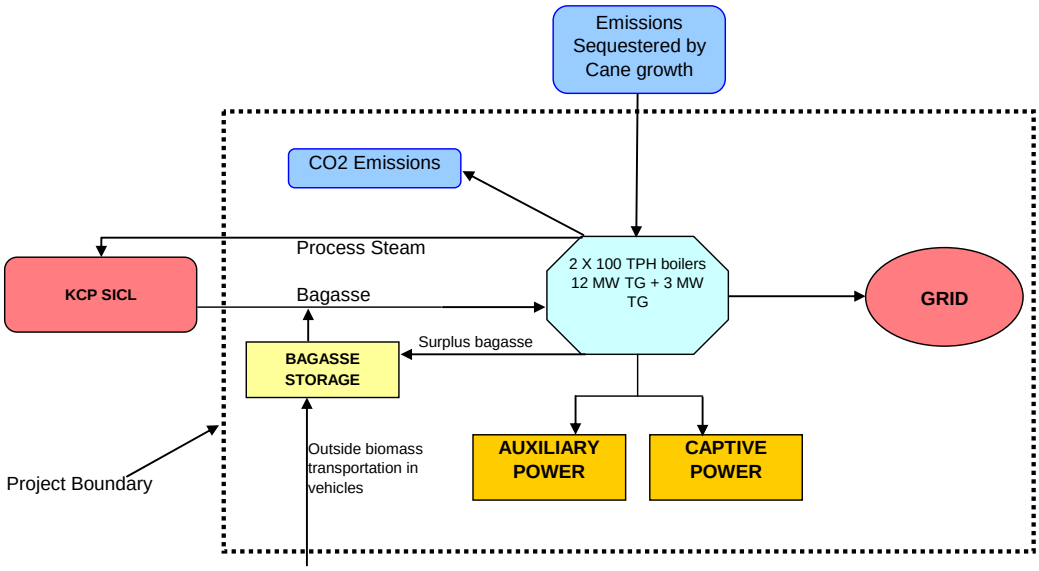

Figure B.1: Spatial extent of project boundary

Emission sources included in the 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 version 04. 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 generation	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	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 version 04, project participants have determined the baseline scenario and demonstrated additionality using the "Tool for the determination and assessment of additionality" (version 03) shown in Figure B.2 of section B.5 below.

Selection of the most plausible baseline scenario:

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 various alternatives to the project activity are being identified in this section separately for power, heat and biomass. The main criteria for identifying the alternatives are that they should be able to deliver services and output equivalent to that of the project activity.

Alternatives available for power generation:

P1 The proposed project activity not undertaken as a CDM project activity

This is a possible alternative scenario for the power generated in the project activity.

P2 The proposed project activity (installation of a power plant), fired with the same type of biomass residues but with a lower efficiency of electrical generation (e.g. an efficiency that is common practice in the relevant industry sector)

This is a possible alternative to the power generated in the project activity. However, it may not be a credible alternative since the existing cogeneration plant itself is of lower efficiency (21.5 ATA) than the project plant (43 ATA). There is no necessity to retrofit the existing plant to continue its operation with lower efficiency. Therefore, this alternative is not considered further.

P3 The generation of power in an existing captive power plant, using only fossil fuels

This is not an alternative to power generation since there is no fossil fuel based power plant at the site. Therefore, this alternative is not considered further.

P4 The generation of power in the grid

This is a possible alternative scenario for the power generated in the project plant. The entire quantity of power generated in the project activity or part of it could be generated in the grid. However, the option of 100% of power generation of project plant to be generated in the grid is not a credible option since captive cogeneration is an essential aspect in sugar mills for economical operation. However, the

incremental power generation between the project plant and other power generation alternatives would be generated in the grid. Therefore option P4 will not be stand alone alternative, rather, it would be combined with other alternatives.

P5 The continuation of power generation in an existing biomass residue fired power plant, fired with the same type of biomass residues 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
This is a possible alternative scenario for the power generated in the project activity. In this case, since the quantity of power generation would be smaller than the project plant, the incremental electricity generation would have been generated in the grid (Option P4).

P6 The continuation of power generation in an existing biomass residue fired power plant, fired with the same type of biomass residues as in the project activity and, at the end of the lifetime of the existing plant, replacement of that plant by a similar new plant.
This is a possible alternative scenario for the power generated in the project activity. However, at the end of the lifetime of the existing plant, higher efficiency technology (similar to the project activity) would have penetrated the sector to a good extent. KCP SICL would rather implement the higher efficiency technology than a similar new plant. Therefore, this alternative is not considered further.

Alternatives available for heat generation:
H1 The proposed project activity not undertaken as a CDM project activity
This is a possible alterative to the heat generated in the project activity

H2 The proposed project activity (installation of a cogeneration power plant), fired with the same type of biomass residues but with a different efficiency of heat generation (e.g. an efficiency that is common practice in the relevant industry sector)
This is a possible alterative to the heat generated in the project activity. However this may not be a credible alternative since there is already a biomass residue fired cogeneration plant with a lower efficiency existing at the project site. KCP SICL would rather continue operating the existing plant than install a new plant of similar efficiency at high cost. Therefore, this alternative is not considered further.

H3 The generation of heat in an existing captive cogeneration plant, using only fossil fuels

This is a not a credible alterative to the heat generated in the project activity as there are no fossil fuel based captive cogeneration plant in the project site.

H4 The generation of heat in boilers using the same type of biomass residues

This is a possible alterative to the heat generated in the project activity. However, it is not a realistic alternative since cogeneration of heat and power is the established norm in sugar industries. Combustion of biomass residues in heat only boilers is an inefficient method compared to cogeneration and therefore cogeneration of power is an inherent and necessary component of any modern sugar mill from efficiency and economic point of view. Therefore, this alternative is not considered further.

H5 The continuation of heat generation in an existing biomass residue fired cogeneration plant, fired with the same type of biomass residues 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.

This is a possible alterative to the heat generated in the project activity.

H6 The generation of heat in boilers using fossil fuels

This is a possible alterative to the heat generated in the project activity. However, it is not a realistic alternative since cogeneration of heat and power from biomass residues is the established norm in sugar industries. Combustion of fossil fuels in heat only boilers is an inefficient and uneconomic method compared to biomass cogeneration and therefore cogeneration of power is an inherent and necessary component of any modern sugar mill from efficiency and economic point of view. Therefore, this alternative is not considered further.

H7 The use of heat from external sources, such as district heat

This is a possible alterative to the heat generated in the project activity. However, it is not a realistic alternative since cogeneration of heat and power from biomass residues is the established norm in sugar industries. Use of heat from external sources is an uneconomic method compared to biomass cogeneration and therefore cogeneration of power is an inherent and necessary component of any modern sugar mill from efficiency and economic point of view. Therefore, this alternative is not considered further.

H8 Other heat generation technologies (e.g. heat pumps or solar energy)

This is a possible alterative to the heat generated in the project activity. However, it is not a realistic alternative since cogeneration of heat and power from biomass residues is the established norm in sugar industries. Heat generation from other technologies is an uneconomic method compared to biomass cogeneration and therefore cogeneration of power is an inherent and necessary component of any modern sugar mill from efficiency and economic point of view. Therefore, this alternative is not considered further.

Alternatives available for biomass:

B1 The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.
This is a possible alternative scenario for the biomass used in the project activity. However, it may not be a realistic alternative since biomass residue fired cogeneration is an established norm in sugar mills from an efficiency and economic point of view. KCP SICL would require the biomass residues for combustion in a cogeneration plant to meet its energy requirements. Only the surplus biomass residues (that are not used in the project activity case) can be used for other purposes. Therefore, this alternative is not considered further.

B2 The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields.
This is a possible alternative scenario for the biomass used in the project activity. However, it may not be a realistic alternative since biomass residue fired cogeneration is an established norm in sugar mills from an efficiency and economic point of view. KCP SICL would require the biomass residues for combustion in a cogeneration plant to meet its energy requirements. Only the surplus biomass residues (that are not used in the project activity case) can be used for other purposes. Therefore, this alternative is not considered further.

B3 The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.
This is a possible alternative scenario for the biomass used in the project activity. However, it may not be a realistic alternative since biomass residue fired cogeneration is an established norm in sugar mills from

an efficiency and economic point of view. KCP SICL would require the biomass residues for combustion in a cogeneration plant to meet its energy requirements. Only the surplus biomass residues (that are not used in the project activity case) can be used for other purposes. Therefore, this alternative is not considered further.

B4 The biomass residues are used for heat and/or electricity generation at the project site
This is a possible alternative scenario for the biomass used in the project activity.

B5 The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plant
This is a possible alternative scenario for the biomass used in the project activity. However, it may not be a realistic alternative since biomass residue fired cogeneration is an established norm in sugar mills from an efficiency and economic point of view. KCP SICL would require the biomass residues for combustion in a cogeneration plant to meet its energy requirements. Only the surplus biomass residues (that are not used in the project activity case) can be used for other purposes. Therefore, this alternative is not considered further.

B6 The biomass residues are used for heat generation in other existing or new boilers at other sites
This is a possible alternative scenario for the biomass used in the project activity. However, it may not be a realistic alternative since biomass residue fired cogeneration is an established norm in sugar mills from an efficiency and economic point of view. KCP SICL would require the biomass residues for combustion in a cogeneration plant to meet its energy requirements. Only the surplus biomass residues (that are not used in the project activity case) can be used for other purposes. Therefore, this alternative is not considered further.

B7 The biomass residues are used for other energy purposes, such as the generation of biofuels
This is a possible alternative scenario for the biomass used in the project activity. However, it may not be a realistic alternative since biomass residue fired cogeneration is an established norm in sugar mills from an efficiency and economic point of view. KCP SICL would require the biomass residues for combustion in a cogeneration plant to meet its energy requirements. Only the surplus biomass residues (that are not used in the project activity case also) can be used for other purposes. Therefore, this alternative is not considered further.

B8 The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry)

This is a possible alternative scenario for the biomass used in the project activity. However, it may not be a realistic alternative since biomass residue fired cogeneration is an established norm in sugar mills from an efficiency and economic point of view. KCP SICL would require the biomass residues for combustion in a cogeneration plant to meet its energy requirements. Only the surplus biomass residues (that are not used in the project activity case also) can be used for other purposes. Therefore, this alternative is not considered further.

List of plausible alternative scenarios to the project activity:

- ***Identified credible alternatives for power generation are P1, P4 and P5.***
- ***Identified credible alternatives for heat generation are H1 and H5.***
- ***Identified credible alternative for biomass residues is B4.***

Realistic and credible combinations of the alternatives for power, heat and biomass residues identified above are considered as plausible alternatives to the project activity and are listed below. These alternatives are in line with the combinations (scenarios) listed in ACM0006.

Baseline Alternative 1 (BA1):

Combination of P1, H1 and B4.

The implementation of the project activity not undertaken as a CDM project activity. Under this alternative, KCP SICL could implement the project activity (i.e., the replacement of the low pressure TGs with high pressure (43 ATA) TGs) without undertaking it under CDM. The required technology was available to replace the low pressure TGs with high pressure TGs. Though it is a possible alternative, the rate of return of the project was too low for the project to be implemented.

Baseline Alternative 2 (BA2):

Combination of P4, P5, H5 and B4.

The continuation of power and heat generation in the existing cogeneration plant using the same type of biomass residues as in the project activity and without any retrofits. This alternative corresponds to scenario 14 of ACM0006. Under this alternative, KCP SICL would continue to operate the existing low pressure (21.5 ATA) TGs by firing bagasse in the boiler and without making any modifications. This configuration could meet the power and steam requirements of KCP SICL.

The description of scenario 14 as per ACM0006 version 04 and justification of how this baseline alternative falls under this scenario is provided below:

- The project activity involves the improvement of energy efficiency of an existing biomass residue fired power plant by retrofit or replacement of the existing biomass residue fired power plant.
  The project involves the improvement of energy efficiency of the existing bagasse based cogeneration plant by the replacement of the low pressure TG sets with high pressure TG sets
- The retrofit or replacement increases the power generation capacity, while the thermal firing capacity is maintained.
  The replacement increases the power generation capacity from 10 MW to 15 MW, whereas the total bagasse firing capacity of the boiler has not changed.
- In the absence of the project activity, the existing power plant would continue to operate without significant changes, until it would need to be replaced at the end of its technical lifetime.
  In the absence of the project activity, the existing TGs would have continued to operate without any significant changes until it would need to be replaced at the end of its technical lifetime.
- The same type and quantity of biomass residues as in the project plant would be used.
  In the absence of the project activity, the existing power plant would have used the same quantity of bagasse as the fuel
- Consequently, the power generated by the project plant would in the absence of the project activity be generated (a) in the same plant (without project implementation) and – since power generation is larger due to the energy efficiency improvements – (b) partly in power plants in the grid.
  In the absence of the project activity, the power generated by the 15 MW project plant would partly be generated in the existing 10 MW plant and partly (5 MW) in the grid.
- In case of cogeneration plants, the heat generated by the project plant would in the absence of the project activity be generated in the same plant (the heat generated per biomass input is smaller or the same after the implementation of the project activity).

In the absence of the project activity, the heat generated by the project plant (144 TPH of process steam) would be generated in the existing (pre-project) plant.

Thus, the BA2 clearly falls under scenario 14 of ACM0006 version 04.

As per ACM0006, the step 2 (investment analysis) of the "Tool for the demonstration and assessment of additionality" version 03 is used to determine the most plausible baseline scenario among the above two alternatives.

Investment analysis of the plausible alternative baseline scenarios:

Sub-step 2.b – Investment comparison analysis option is applied.

As per the investment comparison analysis detailed in section B.5, the BA1 has an Internal Rate of Return (IRR) of 8.6% whereas the BA2 would provide an IRR of 16%. Since BA2 is the most economically attractive alternative, this is selected as the most plausible baseline scenario.

Most plausible baseline scenario for the project activity:

Baseline Alternative 2 (BA2):

Combination of P4, P5, H5 and B4.

The continuation of power and heat generation in the existing cogeneration plant using the same type of biomass residues as in the project activity and without any retrofits. This alternative corresponds to scenario 14 of ACM0006.

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.

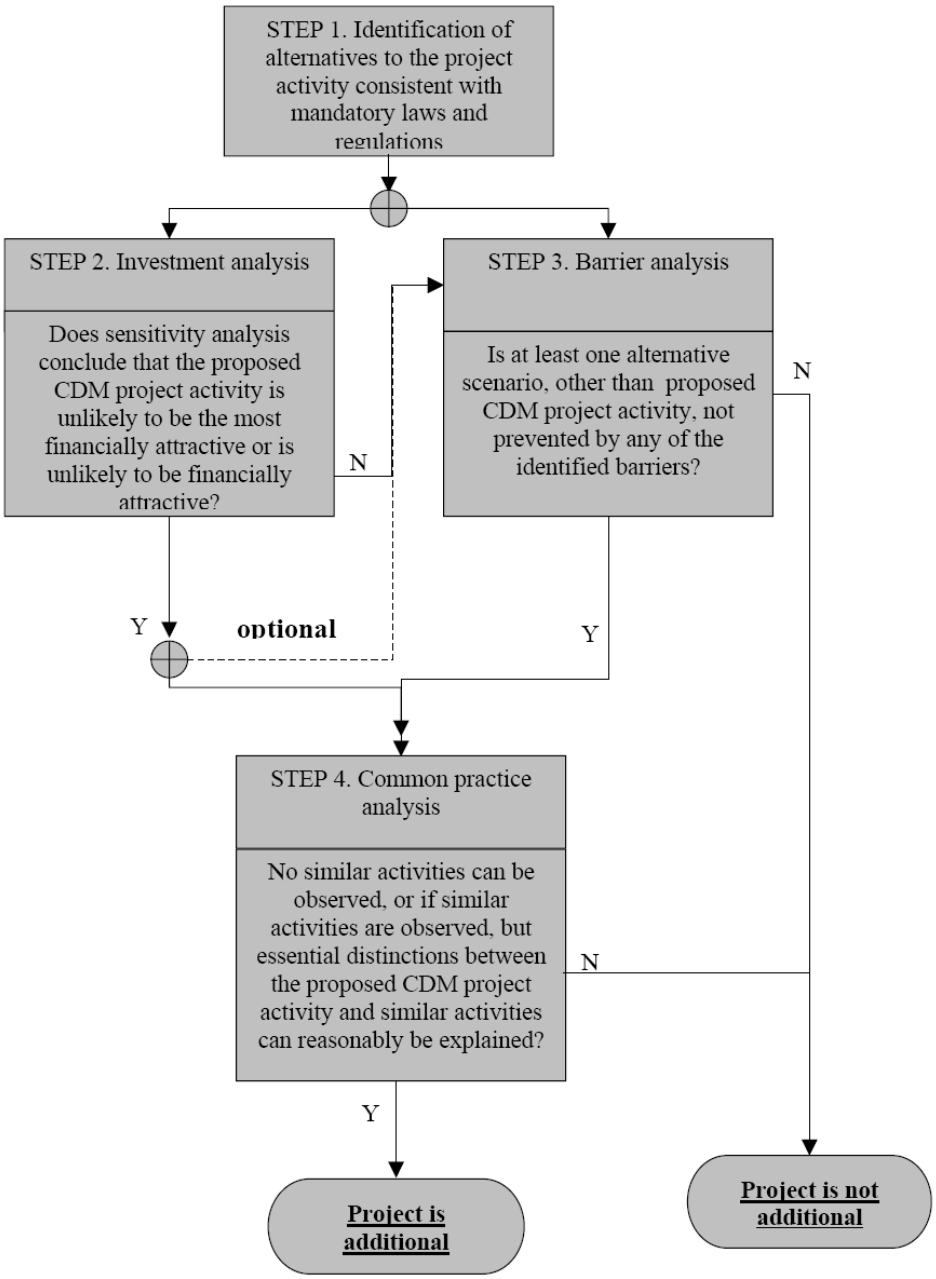


Figure B.2: Steps in the additionality tool

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 and assessment of Additionality") and the most plausible baseline scenario has been identified in Section B.4.

Sub-step 1b: Consistency with mandatory 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 or in a high efficiency 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.

STEP 2 - INVESTMENT ANALYSIS

This step is used to determine which of the plausible baseline alternatives are the most economically attractive. 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.

Appropriate financial indicator:

Under the investment analysis, it is required to select the appropriate financial indicator based on the project type and decision making context. The internal rate of return (IRR) is chosen as the appropriate financial indicator for this project activity. This is because a standard benchmark for IRR is available for the type of project activity whereas the no standard benchmarks are available for other indicators such as NPV, cost benefit ratio and levelized cost of generation. Since KCP SICL is the only project promoter, *equity IRR* is considered as the suitable financial indicator for the project activity against *project IRR* as prescribed by the "Tool for the assessment and demonstration of additionality". The sector specific and region specific benchmark equity IRR has been identified. The Andhra Pradesh Electricity Regulatory Commission (APERC) has considered a standard benchmark[5] 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.

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[6]. The comparison of the financial indicators is provided below:

Alternatives	Equity IRR
Baseline Alternative 1 (Project activity without CDM benefits)	8.6 %
Baseline Alternative 2 (Continuation of the existing configuration. Since this alternative does not involve any investment, it is assumed that the project promoters would invest an equivalent amount in other businesses)	16 %

Sensitivity analysis

[5] This benchmark IRR corresponds to the minimum rate of return the investors would get by investing in other options than the project activity

[6] Using assumptions as provided in APERC tariff order.

The following sensitivity analysis of alternative 1 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	8.6%	8.4%	8.9%
+10% Gen	9.8%	9.6%	10%
-10% Gen	7.4%	7.2%	7.7%

Ranking of the alternatives based on investment analysis:

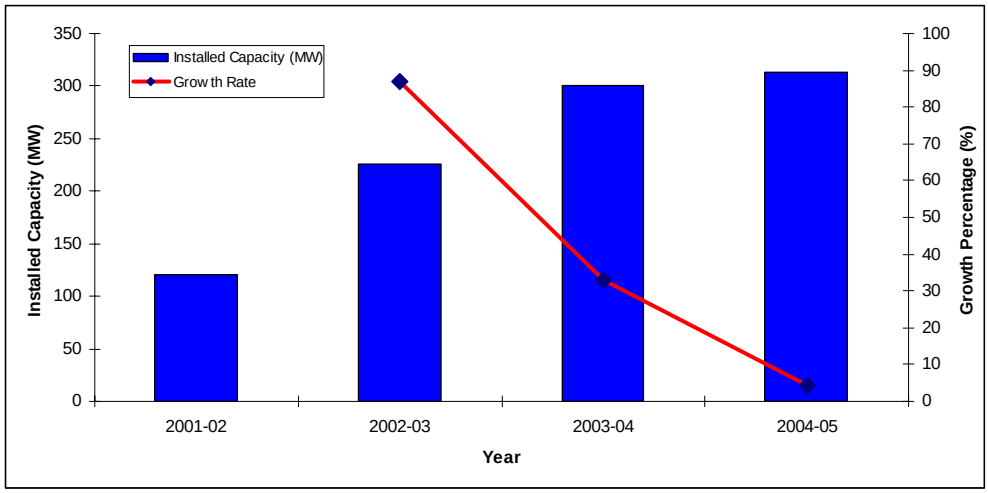
It may be noted that the IRR for alternative 1 is always lower than the IRR for alternative 2 under any of the combination of scenarios and therefore the conclusion that the alternative 1 is not the most economically attractive option. ***The alternative 2 (continuation of the existing cogeneration set up) is the most economically attractive alternative.***

The next step as per Figure B.2 is Step 4: Common practice analysis

STEP 4 - COMMON PRACTICE ANALYSIS

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

An analysis of the extent of grid connected biomass projects in the state show the following results:



It may be noted that there has been a good growth in biomass power plants from year 2000 to 2004 and most of the installed capacity has been commissioned during these years. However, after 2003-04, there has been drastic drop in the growth rate. This is mainly due to power purchase tariff revision by the Andhra Pradesh Electricity Regulatory Commission (APERC) in March 2004. APERC reduced the power tariff rates for non-conventional energy sources from INR 3.48/- per unit to a two part variable tariff (INR 2.79/- per unit for 2004-05) which varies with the plant load factor and age of the plant. Subsequent to the tariff revision, there has been a serious drop in the growth of biomass based grid connected plants in the state of Andhra Pradesh, which is evident from the statistics[7]. KCP SICL's project activity was conceptualized in this period. Thus, under similar regulatory framework and investment climate, only 10 MW capacity has been implemented.

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

Out of the total 300 MW installed capacity of biomass power plants at the time of project conceptualization (year 2004), only around 10 MW has been added after the tariff revision (i.e., under similar regulatory and investment climate as the project activity). The tariff revision has had a huge

[7] Supporting documents for the data shown is provided to the DOE.

impact on the viability of biomass power plants. At this period of time, the implementation of the project activity is clearly against the business trend and therefore not a common practice.

Since all the criteria of the "Tool for demonstration and assessment of Additionality" are satisfied, the project may be considered additional.

Consideration of CDM:

During 2004, KCP SICL explored the surplus power generation potential at its Vuyyuru 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 September 2004 during which KCP SICL management took a decision to go ahead with the project. KCP SICL considered that the prospective CDM revenues[8] could help offset the risks faced by the project activity and enable its long term sustainability.

[8] Copy of proposal submitted to the Board and minutes of the meeting would be submitted to the DOE

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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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. This section elaborates on the formula used to calculate the project emissions, baseline emissions, leakage and net emission reductions based on ACM0006.

As defined section B.4 and B.5 above, the baseline alternative 2 is the most likely baseline scenario which is a combination of options P4, P5, H5 and B4. This corresponds to scenario 14 of ACM0006 and therefore, for this project activity, the formula applicable to baseline scenario 14 would be used.

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), from transportation of biomass from other sites to the project activity, CO_2 emissions from electricity consumption and CH_4 emissions from biomass combustion if included in the project boundary. Such emissions are calculated by using the below equations:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \cdot PE_{Biomass,CH4,y}$$

Where:

PET_y	CO_2 emissions during the year y due to transportation of the biomass residues to the project plant (tCO_2/yr)
$PEFF_y$	CO_2 emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuel consumption at the project site that is attributable to the project activity (tCO_2/yr)
$PE_{EC,y}$	CO_2 emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO_2/yr)
GWP_{CH4}	Global Warming Potential for methane valid for the relevant commitment period
$PE_{Biomass,CH4,y}$	CH_4 emissions from the combustion of biomass residues during the year y (tCH_4/yr). This is not applicable to this project activity as it is excluded from the project boundary both for the calculation of baseline emissions and project emissions.

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*):

$$PEFF_y = \sum (FF_{projectplant,i,y} + FF_{projectsite,i,y}) xNCV_i xEF_{co_2,FF,i}$$

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 in the project activity during the year y in a volume or mass unit. It may be noted that the project activity boilers do not[9] have the provision to co-fire fossil fuel and therefore would remain zero.
$FF_{projectsite,i,y}$	is the quantity of fuel type *i* combusted due to the project activity in the site during the year y in a volume or mass unit. Fossil fuel combustion in standby DG sets during start-up or maintenance activities and vehicles used in feeding biomass will not be included in this since these would have anyway happened in the baseline scenario also. Only that fossil fuel consumption attributable to the energy efficiency improvement would be included in this parameter.
$EF_{CO2,FF,i}$	is the CO_2 emission factor of the fossil fuel type 'i' in tCO_2/GJ
NCV_i	is the calorific value of the fossil fuel in GJ per mass unit.

Carbon dioxide emissions from electricity consumption ($PE_{EC,y}$):

There is no incremental electricity consumption as a result of the project activity. The auxiliary electricity consumption of the power plant is accounted by considering only the "net generation" in the baseline emission calculations. Any electricity imported from the grid during start-up or maintenance activities would not be included in this parameter since these this would have anyway happened in the baseline scenario also.

Methane emission from combustion of biomass residues

The project participants have opted to exclude this source from the project boundary and therefore this need not be calculated or monitored.

B.6.1.2 Emission reductions due to displacement of electricity:

Emission reductions due to the displacement of electricity is calculated by multiplying the net quantity of increased electricity generated with biomass residues as a result of the project activity (EG_y) with the CO_2 baseline emission factor for the electricity displaced due to the project ($EF_{electricity,y}$), as follows:

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

Where:

$ER_{electricity,y}$	Emission reductions due to displacement of electricity during the year y (tCO_2/yr)
EG_y	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh)
$EF_{electricity,y}$	CO_2 emission factor for the electricity displaced due to the project activity during the year y (tCO_2/MWh)

Determination of electricity baseline emission factor (EF_y):

[9] Declaration from the equipment supplier that the boilers don't have provision to co-fire fossil fuels would be provided

ACM0006 recommends that if 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). The emission factor is determined in the following three steps:

As prescribed by ACM0002, combined margin emission factor of the grid is calculated as follows:

$\mathbf{BEF_y = w_{OM}.EF_{OM,\,y} + w_{BM}.EF_{BM\,,\,y}}$

Where,

w_{OM}	Weight of the operating margin emission factor (0.5 default value as per ACM0002)
$EF_{OM,\,y}$	Operating margin emission factor calculated as per ACM0002
w_{BM}	Weight of the build margin emission factor (0.5 default value as per ACM0002)
$EF_{BM,y}$	Build margin emission factor calculated as per ACM0002
BEF_y	Combined margin baseline emission factor of the grid

Operating margin (OM):

ACM0002 provides four options for calculating OM. Option (a) "Simple OM" has been adopted here and the formula for calculating same is described below:

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

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, excluding low-operating cost and must-run power plants, and including imports 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, and
$GEN_{j,y}$	Is the electricity (MWh) delivered to the grid by source *j*

The CO_2 emission coefficient $COEF_i$ is obtained as:

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

For calculations, local values of NCV_i and $EFCO_{2i}$ from Central Electricity Authority (CEA) reports have been used. The *ex-ante* data vintage of 3-year average, based on the most recent statistics available at the time of PDD submission has been used for the calculation. CEA data for years 2003-04, 2004-05 and 2005-06 are used for the calculations. Refer Annex 3 for details.

Build Margin:

The build margin is calculated as the weighted average emissions of recent capacity additions to the reference grid, based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The PDD has adopted *ex-ante* option for build margin calculation.

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

where,

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

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.

Central Electricity Authority (CEA) of India has published a CO_2 baseline database for the regional grids of India. The database includes operating margin, build margin and combined margin emission factors for the regional grids calculated in accordance with the above formula as prescribed by ACM0002. For this project activity, the combined margin baseline emission factor value for the southern regional grid has been directly adopted from the CEA database (Refer Annex 3 for details). The combined margin emission factor as per CEA database is shown below:

$EF_{OM,y}$ = 1.00 tCO_2/MWh

$EF_{BM,y}$ = 0.71 tCO_2/MWh

$EF_{CM,y}$ = 0.86 tCO_2/MWh

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 $\varepsilon_{el,pre\ project}$ *(or* $\varepsilon_{el,baseline\ plant}$*)* 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. For calculating this, three years data vintage is used as required by ACM0006.

$\varepsilon_{el,project\ plant,y}$ -is average net energy efficiency of electricity generation in the project plant, expressed in MWhel/MWhbiomass calculated as below:

$$\varepsilon_{el,projectplant} = \frac{EG_{projectplant,y}}{-\sum_k NCV_k.BF_{k.y} + \sum_i NCV_i.FF_{projectplant,i,y}}$$

Since the project plant does not have provision to co-fire fossil fuel, the above equation reduces to:

$$\varepsilon_{el,projectplant} = \frac{EG_{projectplant,y}}{-\sum_k NCV_k.BF_{k.y}}$$

B.6.1.3 Emission reductions due to displacement of heat:

In the case of cogeneration plants, project participants shall determine the emission reductions or increases due to displacement of heat ($ER_{heat,y}$). In scenario 14, heat and electricity in the absence of the project activity is generated in a low pressure low efficiency cogeneration plant, i.e. the efficiency of electricity generation is lower than in the project plant. The efficiency of heat generation, i.e. the heat generated per quantity of biomass residue fired, may differ between the project plant and the plant(s) in the baseline scenario. This implies that the project implementation may result in lower quantity of heat generation compared to the baseline scenario. This may result in additional heat generation from other sources resulting in GHG emissions.

However, in this project activity case, the efficiency of heat generation remains the same in the baseline and the project scenario and therefore, $ER_{heat,y}$ = 0 as per ACM0006 (Page 35 of the Meth). Refer the excel sheet provided as appendix to the PDD where the pre-project and project scenario energy balance shows that the efficiencies in the project scenario and the baseline scenario remains the same.

B.6.1.4 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.

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

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

$BE_{biomass,y}$ - Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y* (tCO_2e/yr)

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

For this project activity, $ER_{heat} = 0$ and $L_y = 0$ (Refer section B.6.1.3 and B.6.1.4 above). Baseline emissions due to natural decay or uncontrolled burning are excluded from the project boundary ($BE_{biomass,y} = 0$). Therefore the emission reduction equation for this project activity reduces to:

$$ER_y = ER_{electricity,y} - PE_y$$

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

Data / Parameter:	$\varepsilon_{el,pre\text{-}project}$
Data unit:	$MWh_{el}/MWh_{biomass}$
Description:	Average efficiency of electricity generation in the pre-project scenario
Source of data used:	KCP SICL
Value applied:	0.0285
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per guidelines provided in ACM0006
Any comment:	-

Data / Parameter:	$\varepsilon_{th,pre\text{-}project}$
Data unit:	$MWh_{th}/MWh_{biomass}$
Description:	Average efficiency of heat generation in the pre-project scenario
Source of data used:	KCP SICL
Value applied:	0.528
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per guidelines provided in ACM0006
Any comment:	-

Data / Parameter:	$EF_{grid,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin baseline emission factor of the southern regional grid
Source of data to be used:	Calculated as per ACM0002 guidelines using data from CEA/IPCC
Value of data applied	0.86
Justification of the choice of data or description of measurement methods and procedures actually applied :	The project participants have chosen to calculate this value on a ex-ante basis once in the beginning of the project activity. This will not be updated annually. Calculated as per ACM0002 guidelines using data from CEA/IPCC. Refer annex 3 for details.
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. For the values obtained by applying the methodology formula, the calculation method is indicated under the respective "Notations". For detailed calculations, please refer excel sheets enclosed as appendix to the PDD.

Project emissions:

Emissions due to combustion of fossil fuels in the project activity:					
S.No	**Notation**	**Parameter**	**Unit**	**Value**	**Comments**
1	$FF_{project\ plant,i,y}$	Quantity of fossil fuel type 'i' used in project plant	T/yr	0	The project boilers do not have provision for co-firing fossil fuels. Therefore this parameter would remain zero. No uncertainties in this parameter.
2	$FF_{project\ site,i,y}$	Quantity of fossil fuel type 'i' used onsite	T/yr	0	Fossil fuel combustion in standby DG sets during start-up or maintenance activities and vehicles used in feeding biomass will not be included in this since these would have anyway happened in the baseline scenario also. Only that fossil fuel consumption attributable to the energy efficiency improvement would be included in this parameter. Uncertainties for this parameter are addressed above.
3	$NCV_{,i}$	Calorific Value	TJ/T fossil fuel	0	Will be measured if used. Envisaged only during emergencies. No uncertainties in this parameter.
4	$EF_{CO2,FF,i}$	CO_2 emission factor	tCO_2/TJ	0	IPCC default value for the specific fuel used would be adopted. No uncertainties in this parameter.
5	$PEFF_y$ ((1+2)*3*4)	CO_2 emissions	tCO_2/yr	0	Methodology formula.

Emissions due to combustion of fossil fuels for transportation of biomass:					
6	$BF_{,i,y}$	Quantity of biomass type 'i' bought and transported from outside for off-season operation	T	0	Outside biomass purchase not expected since sufficient captive bagasse is available. Outside biomass purchased only during emergencies like floods. No uncertainties in this parameter.

7	TL_y	Average truck load of the trucks used	T	10	Average rated tonnage of trucks used. No uncertainties in this parameter.
8	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.
9		Truck fuel economy for 10 tonne truck	Kms/litre of fuel	4	Data from local truck operator.
10		Truck fuel economy	Litres/000 'kms	250	Based on above data (1000/4 = 250)
11		Density of diesel	Kg/litre of fuel	0.85	Bureau of Energy Efficiency reference material
11		Fuel consumption per 1000 kilometer for 10 tonne truck	kg/000'kms	212.5	Based on above parameters (250 X 0.85 = 212.5). No uncertainties in this parameter.
12		CO_2 emission factor	$kgCO_2/kg$ fuel	3.16	IPCC 2006 guidelines default value for diesel.
13	$EF_{km,CO2}$ (11*12)	Average CO_2 emission factor of the trucks	$kgCO_2/km$	0.6478	Methodology formula. Refer section B.6.1.1 above.
14	PET_y ((6*8*13) / (7))	CO_2 emissions from diesel	tCO_2	0	Methodology formula. Refer section B.6.1.1 above.
15	PE_y (5+14)	Total Project Emissions	tCO_2	0	Methodology formula. Refer section B.6.1.1 above.

Emissions reductions from electricity displacement:

Determination of EGy:					
S.No	**Notation**	**Parameter**	**Unit**	**Value**	**Comments**
1	$EG_{pre\text{-}project,y}$	Generation from the pre-project system in three pre-project years	MWhe	**2003:** 18606.84 **2004:** 18676.63 **2005:** 13367.95	Actual values recorded by KCP SICL. As per consolidated monthwise energy and mass balance for three years calculated based on daily cogeneration report. Refer copies of above documents.

2	$EG_{project\ plant,y}$	Generation from the project plant	MWhe	37576	Based on 140 days operation during the crushing season
3	$BF_{pre\text{-}project,y}$	Fuel Consumption (Pre-project system)	T	**2003:** 250050 **2004:** 245954 **2005:** 188477	Actual values recorded by KCP SICL. As per consolidated monthwise energy and mass balance for three years calculated based on daily cogeneration report. Refer copies of above documents.
4	$\sum BF_{pre\text{-}project,k,y}$. $NCV_{,k,y}$	Fuel Consumption in heat equivalent	$MWh_{biomass}$	**2003:** 660430.88 **2004:** 624634.51 **2005:** 486465.64	Based on NCV of 2200 kcal/kg for bagasse
5	$BF_{project\ plant,y}$	Fuel Consumption (Project system)	T	255150	Based on 140 days operation during the crushing season
6	$\sum BF_{project\ plant,k,y}$. $NCV_{,k,y}$	Fuel Consumption in heat equivalent	$MWh_{biomass}$	652078	Based on NCV of 2200 kcal/kg for bagasse
7	$\varepsilon_{el,\ pre\text{-}project}$ (1/4)	Pre-project efficiency	-	0.0285	Maximum efficiency achieved during the three pre-project years
8	$\varepsilon_{el,\ project\ plant,y}$ (2/6)	Project plant efficiency	-	0.0576	Expected efficiency of project plant. This is also the actual efficiency obtained post project implementation and therefore no uncertainties.
9	EGy (2* (1- (7/8)))	Incremental Energy generation from the project activity	MWh	18079	ACM0006 formula. Refer section. Refer section B.6.1.2 above.
10	$EF_{electricity,y}$	CO_2 baseline emission factor for the grid	tCO_2/MWh	0.86	Data from CEA calculated as guidelines of ACM0002 as recommended by ACM0006. Refer Annex 3 and section B.1.2 above for details.
11	$ER_{electricity,y}$ (9*10)	Emission reduction from electricity displacement	tCO_2	15,547	ACM0006 formula. Refer section B.6.1.2 above.

Net Emission reductions

S.No	Notation	Parameter	Unit	Value
1	$ER_{electricity,y}$	Emission reductions from electricity displacement	tCO_2/yr	15,547
2	PE_y	Project emissions	tCO_2/yr	0
3	ER_y (1-2)	Emission reductions	tCO_2/yr	15,547

There are no uncertainties in the estimation of emission reductions as all the critical values used are based on actual data.

For detailed calculations, please refer excel sheets enclosed as appendix to this PDD.

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

>>

Sr. No.	Operating Years	Baseline Emissions (BEy) (tCO_2)	Project Emissions (PEy) (tCO_2)	Leakage (tCO_2) Ly	Overall Emission Reductions (ERy) (tCO_2)
1.	2007-08	15547	0	0	15547
2.	2008-09	15547	0	0	15547
3.	2009-10	15547	0	0	15547
4.	2010-11	15547	0	0	15547
5.	2011-12	15547	0	0	15547
6.	2012-13	15547	0	0	15547
7.	2013-14	15547	0	0	15547
8.	2014-15	15547	0	0	15547
9.	2015-16	15547	0	0	15547
10.	2016-17	15547	0	0	15547
	Total	**155470**	**0**	**0**	**155470**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$BF_{k,y}$**
Data unit:	Tonnes of dry matter
Description:	Quantity of biomass type *k* combusted in the project plant during year y
Source of data to be used:	ACM0006 recommends "on-site measurements using weight or volume meters". Bagasse generated in-house is monitored based on on-site measurement of parameters in weight and volume meters as described below in "Description of measurement methods". Recorded in log books.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	255,150
Description of measurement methods and procedures to be applied:	"Bagasse combusted = Bagasse generated – (Opening stock - Closing stock in bagasse yard)" Bagasse generated = Cane crush + Water added – Juice produced Cane crush is monitored by weigh bridge. Water added and juice produced is monitored through flow meters. The above method of monitoring is an approved method of monitoring for sugar industries and is used in preparing the Monthly and Annual manufacturing reports (RT 7c and 8c) that are submitted to the Government of India. Frequency of monitoring: Daily
QA/QC procedures to be applied:	Monitored bagasse data would be cross-checked with RT 8c and 7c reports of the plant. Annual bagasse balance would be prepared to cross-check recorded data. Conflict of interest: No conflict of interest in conservative data monitoring. Overestimation of emission reductions is likely if the quantity of biomass consumed is recorded as less than actually consumed since project plant efficiency would increase. There is no other benefit to the promoter by doing so. Further any such mis-recording can be identified in the annual mass balance or comparison with historic efficiency.
Any comment:	

Data / Parameter:	**Moisture content of the biomass**
Data unit:	% water content
Description:	Moisture content of biomass type *k* combusted
Source of data to be used:	Lab chemist log book

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Value of data applied for the purpose of calculating expected emission reductions in section B.5	50% for bagasse
Description of measurement methods and procedures to be applied:	Weights method – The weight of bagasse with moisture and without moisture (after drying in oven) is measured to arrive at the moisture content Frequency of monitoring: Daily
QA/QC procedures to be applied:	Equipments used like mass balances would be calibrated periodically. Conflict of interest: No conflict of interest in conservative data monitoring. Overestimation of emission reductions is likely if the moisture content of biomass consumed is recorded as more than actually consumed since project plant efficiency would increase. There is no other benefit to the promoter by doing so. Further any such mis-recording can be identified in the annual mass balance or comparison with historic data.
Any comment:	

Data / Parameter:	**AVD_y**
Data unit:	Kilometres (Kms)
Description:	Average return trip distance between biomass fuel supply sites and the project site in case of purchased biomass.
Source of data to be used:	Records by KCP SICL on the origin of the biomass – Will be recorded in biomass purchase log books based on information provided by truck operators.
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 and the project activity. Frequency of monitoring: Continuously
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. No potential conflict of interest in conservative data monitoring since truck operators would not provide a lower distance as it will reduce their revenue.
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:	Measured in KCP SICL weigh bridge and recorded in log book
Value of data applied for the purpose of calculating expected	10

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Determined by averaging the weights of each truck carrying biomass to the project plant Frequency of monitoring: Continuously, aggregated annually
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:	**$EF_{km, CO2,y}$**
Data unit:	t CO_2/km
Description:	Average CO_2 emission factor for transportation of biomass with trucks
Source of data to be used:	Sample measurements of the fuel type, fuel consumption and distance traveled for all truck types. Calculate CO_2 emissions from fuel consumption by multiplying with appropriate net calorific values and CO_2 emission factors. For net calorific values and CO_2 emission factors, reliable national default values or, if not available, (country-specific) IPCC default values would be used.
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:	-
QA/QC procedures to be applied:	Cross-check measurement results with literature
Any comment:	

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor for fossil fuel type i
Source of data to be used:	Measurement results – Third party reports
Value of data applied for the purpose of calculating expected emission reductions in section B.5	- (Actual value would be monitored based on type of fossil fuel used)
Description of measurement methods and procedures to be applied:	Analysis of samples of specific fossil fuel used would be conducted at reputed laboratories once in six months whenever fossil fuel is used.

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:	$\mathbf{FF_{project\ plant\ i,y}}$
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 boiler fuel log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	- (There is no provision for firing fossil fuel in the project boiler. However, it is included as required by ACM0006)
Description of measurement methods and procedures to be applied:	The quantity of fossil fuel is measured at the KCP SICL weigh bridge before their unloading into the project site. [Fuel combusted = Opening stock - Closing stock + Fuel purchase if any for the day] Recording Frequency: Daily Proportion of data to be monitored: 100%
QA/QC procedures to be applied:	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock exchanges. No potential conflict of interest in conservative data monitoring as no other type of benefit is available for recording a lower quantity of fossil fuel consumption than actually consumed.
Any comment:	

Data / Parameter:	$\mathbf{FF_{project\ site\ i,y}}$
Data unit:	Tonnes
Description:	Onsite fossil fuel consumption of type 'i' other than co-firing. Fossil fuel combustion in standby DG sets during start-up or maintenance activities and vehicles used in feeding biomass will not be included in this since these would have anyway happened in the baseline scenario also. Only that fossil fuel consumption attributable to the energy efficiency improvement would be included in this parameter.
Source of data to be used:	KCP SICL fuel consumption log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	- (Actual value would be monitored. No incremental fossil fuel consumption expected as a result of the project activity)
Description of measurement methods	The quantity of fossil fuel is measured in volume or weight meters. Monitoring frequency: Continuously.

and procedures to be applied:	
QA/QC procedures to be applied:	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock exchanges. No potential conflict of interest in conservative data monitoring as no other type of benefit is available for recording a lower quantity of fossil fuel consumption than actually consumed.
Any comment:	

Data / Parameter:	**$EG_{project\ plant,y}$**
Data unit:	MWh
Description:	Net quantity of electricity generated in the project plant
Source of data to be used:	KCP SICL Energy meter log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	37,576
Description of measurement methods and procedures to be applied:	The data will be recorded in log books on a daily basis based on energy meters of KCP SICL. Monitoring frequency: Continuously
QA/QC procedures to be applied:	The consistency of the recorded net electricity generation will be cross-checked with receipts from energy sales and the quantity of fuel fired (e.g. check whether the electricity generation divided by the quantity of fuel fired results in a reasonable efficiency that is comparable to previous years) No potential conflict of interest in conservative data recording.
Any comment:	

Data / Parameter:	**$NCV_{i,FF}$**
Data unit:	Kcal/kg
Description:	Calorific value of fossil fuel
Source of data to be used:	Analysis report of reputed laboratory
Value of data applied for the purpose of calculating expected emission reductions in section B.5	- (Actual value would be monitored based on type of fossil fuel used)
Description of measurement methods and procedures to be applied:	Determined by a certified laboratory Monitoring frequency: Once in six months
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. No potential conflict of interest in conservative data recording.
Any comment:	The value will be determined when fossil fuel is used.

Data / Parameter:	**$NCV_{k\,(wet)}$**
Data unit:	GJ/ton of wet matter
Description:	Net calorific value of biomass residue type *k (wet basis)*
Source of data to be used:	Analysis report of reputed laboratory
Value of data applied for the purpose of calculating expected emission reductions in section B.5	9.2 for bagasse (2200 kcal/kg)
Description of measurement methods and procedures to be applied:	Determined by a certified laboratory Monitoring frequency: Once in six months
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. No potential conflict of interest in conservative data recording.
Any comment:	

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Data / Parameter:	**NCV_k**
Data unit:	GJ/ton of dry matter
Description:	Net calorific value of biomass residue type *k*
Source of data to be used:	Analysis report of reputed laboratory
Value of data applied for the purpose of calculating expected emission reductions in section B.5	18.4 for bagasse (4400 kcal/kg)
Description of measurement methods and procedures to be applied:	Determined by a certified laboratory Monitoring frequency: Once in six months
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. No potential conflict of interest in conservative data recording.
Any comment:	

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Data / Parameter:	$BF_{k,y}$ (outside biomass)
Data unit:	Tonnes of dry matter
Description:	Quantity of biomass type *k* purchased from outside and combusted in the project plant during year y
Source of data to be used:	ACM0006 recommends "on-site measurements using weight or volume meters". Biomass purchased is monitored based on on-site measurement of parameters using weigh bridges. "Description of measurement methods". Recorded in log books.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (Outside biomass purchased only during emergencies like floods. Since this is not likely to occur in normal years, this parameter is considered as zero for the estimation.)
Description of measurement methods and procedures to be applied:	Purchased biomass will be monitored in weigh bridges of KCP SICL and recorded electronically. Frequency of monitoring: Continuously
QA/QC procedures to be applied:	Weigh bridges would be calibrated annually. Annual fuel balance would be prepared to cross-check recorded data. Conflict of interest: No conflict of interest in conservative data monitoring. Overestimation of emission reductions is likely if the quantity of biomass consumed is recorded as less than actually consumed since project plant efficiency would increase. There is no other benefit to the promoter by doing so. Further any such mis-recording can be identified in the annual mass balance or comparison with historic efficiency.
Any comment:	This data is used for the calculation of project emissions as a result of outside biomass transportation.

B.7.2 Description of the monitoring plan:

>>

KCP SICL will incorporate a special team for implementing the monitoring procedures as described in section 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)

>>

10/04/2008

KCP Sugar and Industries Corporation Limited

239, Anna Salai, Ramakrishna Buildings,

Chennai – 600 006

The entity is a project participant listed in Annex I.

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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:

>>
03/09/2004

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 from the date of Registration of the project activity.

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:

>>
01/12/2007 or Upon Registration with UNFCCC whichever is later. The project participant confirms that the crediting period would not start before the registration of the project activity.

C.2.2.2. Length:

>>
10 years 0 months

SECTION D. Environmental impacts

>>

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

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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 including possible transboundary impacts is described below:

S.no	Description	Status	Remarks
1	Trade wastewater	The effluent is being treated in Effluent Treatment Plant (ETP) and used for filter cake treatment so as to produce enriched compost. Excess treated water will be discharged. The treated effluent standards are well within the limits. No negative transboundary impacts as the treated water is within PCB limits of 30 mg/ltr.	No negative transboundary impacts.
2	Air emissions	1. Air pollution controlling system available 2. Stack height is 62 mts which is more than the PCB requirement of 30 mts. 3. The emissions are within the limits of APPCB. Latest analysis shows 102.6 mg/NM^3 against the limit of 115 mg/NM^3.	No negative transboundary impacts.
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	They are handled and disposed off properly. No negative transboundary impacts.
4	Hazardous waste	Waste oil is being used for applying on chains.	No negative transboundary impacts
5	Consent for operation (air and water)	Obtained	The consents would be renewed in a frequency required by APPCB.

6	Ambient air quality	The ambient air quality is meeting the standards. Latest analysis shows 152.6 mg/NM^3 against the limit of 200 mg/NM^3.	No negative transboundary impacts.

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 project activity does not fall under the purview of Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forests (MoEF) -Government of India (Reference: Environment Impact Assessment Notification dated 27/01/1994 and its subsequent amendments[10]). As per the EIA notification, expansion projects with investment less than INR 50 crores does not fall under its purview. Since, KCP SICL's project activity is within this investment threshold, an environmental impact assessment need not be undertaken.

[10] http://www.envfor.nic.in/legis/legis.html

SECTION E. Stakeholders' comments

>>

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

>>

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. Individual invitation letters were sent in advance through mail to each of the identified stakeholders mentioning the time, date and venue of the meeting. The stakeholders invited for the meeting are detailed below:

1. Local panchayat (Elected body of representatives administering the local area)
2. Transmission Corporation of Andhra Pradesh (APTRANSCO)
3. Andhra Pradesh Pollution Control Board (APPCB)
4. Non Governmental Organisations in the area

The stakeholder consultation process was held on 23/12/2005 by KCP SICL in order to consult with the stakeholders on their views and possible concerns if any, regarding the CDM project activity. The meeting was held at KCP's Vuyyuru sugar plant complex. KCP SICL representatives described the various aspects of the CDM project activity and clarified doubts of the stakeholders with regard to the CDM project activity. The stakeholders actively participated in the discussions on the CDM project activity and provided their views on the same. Towards the end of the meeting, the stakeholders provided their responses in writing and the same are being submitted to the DOE.

E.2. Summary of the comments received:

>>

All the stakeholders appreciated the project promoter for the efforts taken by KCP SICL in the environmentally friendly route that would contribute to sustainable development of the region. All the concerned stakeholders expressed support for the project activity and no negative comments were received. Further, project activity being an internal power scheme modification project at existing industry, it will have very less negative impact on local stakeholders. To summarise, all stakeholders were of the opinion that the project activity did not have any negative impact and only positively served to mitigate the global warming effect.

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

>>

As there were no negative comments, no corrective action was required to be made by KCP SICL.

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
Postfix/ZIP:	600 006
Country:	India
Telephone:	+91-44-2855 5171
FAX:	+91-44-2855 6617
E-Mail:	kcpsugar@vsnl.com
URL:	
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	B.R
Middle Name:	
First Name:	Jawaharlal
Department:	
Mobile:	+91-94443-85278
Direct FAX:	
Direct tel:	
Personal E-Mail:	beri_lal@yahoo.co.in

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	**2.0**
DATE	**21 June 2007**
BASELINE METHODOLOGY	**ACM0002 / Ver 06**

EMISSION FACTORS

Weighted Average Emission Rate (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.72	0.73	0.74	0.71	0.71	0.71
East	1.09	1.06	1.11	1.10	1.08	1.08
South	0.73	0.75	0.82	0.84	0.78	0.74
West	0.90	0.92	0.90	0.90	0.92	0.87
North-East	0.42	0.41	0.40	0.43	0.32	0.33
India	0.82	0.83	0.85	0.85	0.84	0.82

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

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.98	0.98	1.00	0.99	0.97	0.99
East	1.22	1.22	1.20	1.23	1.20	1.16
South	1.02	1.00	1.01	1.00	1.00	1.01
West	0.98	1.01	0.98	0.99	1.01	0.99
North-East	0.73	0.71	0.74	0.74	0.71	0.70
India	1.02	1.02	1.02	1.03	1.03	1.02

Build Margin (tCO2/MWh) (excl.

Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					0.53	0.60
East					0.90	0.97
South					0.71	0.71
West					0.77	0.63
North-East					0.15	0.15
India					0.70	0.68

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

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.76	0.76	0.77	0.76	0.75	0.80
East	1.06	1.06	1.05	1.07	1.05	1.06
South	0.87	0.85	0.86	0.86	0.85	0.86
West	0.87	0.89	0.88	0.88	0.89	0.81
North-East	0.44	0.43	0.44	0.44	0.43	0.42
India	0.86	0.86	0.86	0.86	0.86	0.85

Annex 4

MONITORING INFORMATION

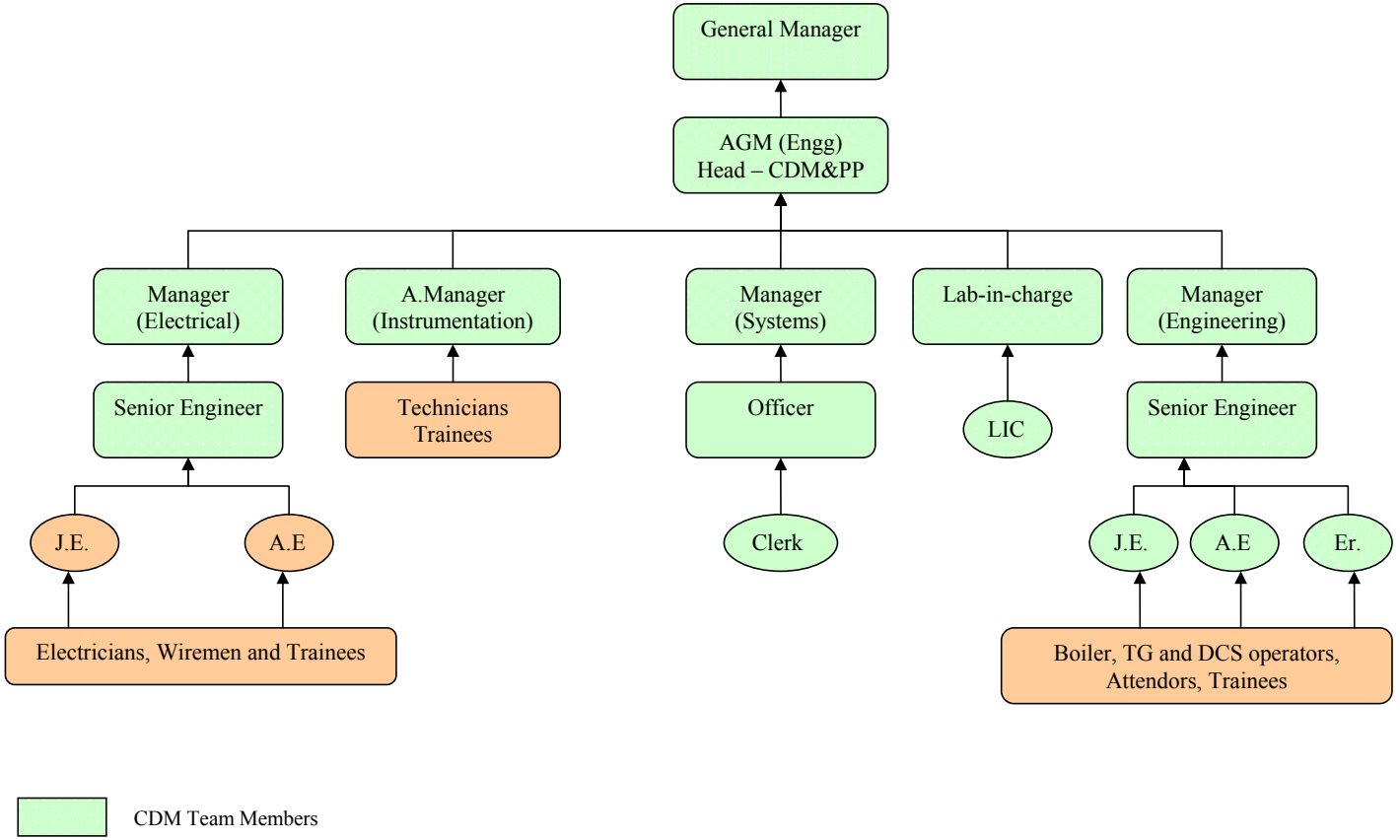
CDM TEAM:

The CDM team comprises of personnel from the Engineering, 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. The organization structure of the CDM team is given in the figure below.

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.

Organization structure showing the power plant and CDM Team



Parameters to be monitored and detailed monitoring procedures:

$EG_{Project\ Plant,gross}$ - Gross energy generation of the project plant (MWh)	
Monitoring methods and procedures	This data will be measured continuously in KCP SICL energy meters. The Engineer (Electrical) will record the generation data on a daily basis in log books.
QA/QC procedures	A monthly energy balance will be prepared to cross-check the recorded generation data with other parameters. In case the deviation in recorded data is beyond the allowable limits for the energy meter used, the meter will be calibrated/rectified at the earliest. For the period of error, data would be adjusted as described under "Data uncertainties and adjustments". Periodic calibration and maintenance of the energy meter will be arranged by the Electrical department.
Reporting	The Senior Engineer (SE) will review and approve the log books on a daily basis and record the data in computer in the form of Daily Cogen Report. The daily report would be reviewed by the Manager (E) and forwarded to the AGM (Engineering). On a monthly basis, a compilation of all the energy parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the daily and monthly energy report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in meter • When meter is dismantled for O&M or calibration • When data is not recorded properly or records are lost • Delay in calibrating the energy meter – In some years, the period between two calibrations may be more than one year due to unavoidable circumstances like extended crushing season of the sugar plant due to which the cogeneration plant cannot be stopped for maintenance. During the above circumstances, the lower value between the below two

	would be adopted for emission reduction calculations: • Gross generation = Captive consumption + Energy exported + Auxiliary consumption • Gross generation = Heat equivalent of biomass fired X Efficiency of the system calculated with latest reliable data • When the period between two calibrations is more than a year, no adjustments need to be done if the meter error during calibration is within limits. If meter error during calibration is above limits by "x%", then "x%" may be deducted from the monitored data for the non-calibrated period for calculating CERs. As far as possible, the calibration and maintenance of the meters would be scheduled when the plant is under shutdown to avoid any data uncertainties.

$EG_{project\ plant,aux}$ - Auxiliary consumption (MWh)	
Monitoring methods and procedures	This data will be measured continuously in KCP SICL energy meters. The Engineer (Electrical) will record the consumption data on a daily basis in log books.
QA/QC procedures	A monthly energy balance will be prepared to cross-check the recorded consumption data with other parameters. In case the deviation in recorded data is beyond the allowable limits for the energy meter used, the meter will be calibrated/rectified at the earliest. For the period of error, data would be adjusted as described under "Data uncertainties and adjustments". Periodic calibration and maintenance of the energy meter will be arranged by the Electrical department.
Reporting	The Senior Electrical Engineer (SE) will review and approve the log books on a daily basis and record the data in computer in the form of Daily Cogen Report. The daily report would be reviewed by the Manager (E) and forwarded to the AGM (Engineering). On a monthly basis, a compilation of all the

	energy parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the daily and monthly energy report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in meter • When meter is dismantled for O&M or calibration • When data is not recorded properly or records are lost • Delay in calibrating the energy meter – In some years, the period between two calibrations may be more than one year due to unavoidable circumstances like extended crushing season of the sugar plant due to which the cogeneration plant cannot be stopped for maintenance. During the above circumstances, the lower value between the below two would be adopted for emission reduction calculations: • Auxiliary consumption = Gross generation -Captive consumption - Energy exported • Auxiliary consumption = Gross generation X % Auxiliary consumption calculated based on most recent reliable data available • When the period between two calibrations is more than a year, no adjustments need to be done if the meter error during calibration is within limits. If meter error during calibration is above limits by "x%", then "x%" may be deducted from the monitored data for the non-calibrated period for calculating CERs. As far as possible, the calibration and maintenance of the meters would be scheduled when the plant is under shutdown to avoid any data uncertainties.

$EG_{Project\ Plant,\ Net}$ - **Net energy generation (MWh)**	
Monitoring methods and procedures	This data will be measured as the difference between gross generation and auxiliary consumption measured in KCP SICL energy meters.
QA/QC procedures	Since this data is based on monitored Gross generation and auxiliary consumption data, separate QA/QC procedures are not necessary.
Reporting	The Senior Electrical Engineer (SE) will review and approve the log books on a daily basis and record the data in computer in the form of Daily Cogen Report. The daily report would be reviewed by the Manager (E) and forwarded to the AGM (Engineering). On a monthly basis, a compilation of all the energy parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the daily and monthly energy report and archive it.
Data uncertainties and adjustments	Since this data is based on monitored Gross generation and auxiliary consumption data, separate procedures for data adjustments are not necessary.

Captive consumption of factory (MWh) – The methodology does not necessitate monitoring of this parameter. However, it is monitored for reference purposes.	
Monitoring methods and procedures	This data will be measured continuously in KCP SICL energy meters. The Engineer (Electrical) will record the consumption data on a daily basis in log books.
QA/QC procedures	A monthly energy balance will be prepared to cross-check the recorded consumption data with other parameters. In case the deviation in recorded data is beyond the allowable limits for the energy meter used, the meter will be calibrated/rectified at the earliest. For the period of error, data would be adjusted as described under "Data uncertainties and adjustments". Periodic calibration and maintenance of the energy meter will be arranged by the Electrical department.

Reporting	The Senior Electrical Engineer (SE) will review and approve the log books on a daily basis and record the data in computer in the form of Daily Cogen Report. The daily report would be reviewed by the Manager (E) and forwarded to the AGM (Engineering). On a monthly basis, a compilation of all the energy parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the daily and monthly energy report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in meter • When meter is dismantled for O&M or calibration • When data is not recorded properly or records are lost During the above circumstances, the lower value between the below two would be adopted for emission reduction calculations: • Captive consumption = Gross generation -Auxiliary consumption - Energy exported • Captive consumption = Cane crushed X Specific power consumption for crushing calculated based on most recent reliable data available

$EG_{Project\ Plant,\ export}$ - Energy exported (MWh) - The methodology does not necessitate monitoring of this parameter. However, it is monitored for reference purposes.	
Monitoring methods and procedures	This data will be measured continuously in APSPDCL energy meters located at the switchyard/sub-station. The energy exported would be recorded by APSPDCL personnel in the presence of KCP SICL personnel on a monthly basis in the "Joint meter reading" log book. The Engineer (Electrical) also records this data in log books on a daily basis.
QA/QC procedures	The recorded data would be cross-checked with a check meter installed along with the main energy meter. In case the deviation in recorded data is

	beyond the allowable limits for the energy meters used, the meter will be calibrated/rectified at the earliest. For the period of error, data would be adjusted as described under "Data uncertainties and adjustments".
Reporting	The Senior Electrical Engineer (SE) will review and approve the log books on a daily basis and record the data in computer in the form of Daily Cogen Report. The daily report would be reviewed by the Manager (E) and forwarded to the AGM (Engg). On a monthly basis, a compilation of all the energy parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the daily and monthly energy report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in main meter or check meter • When meter is dismantled for O&M or calibration Since there are two meters installed, during any of the above problems in one meter, the other meter would still be working and therefore the recorded data of the other meter will be used for the error period.

Biomass combusted (captive bagasse) – in Tonnes	
Monitoring methods and procedures	This data will be measured as follows: *"Bagasse combusted = Bagasse generated – (Opening stock - Closing stock in bagasse yard)"* This data is recorded on a daily basis by Engineer – Mech in log books. During most crushing season days, the entire quantity of bagasse generated would be directly fed to the boiler. However, during some days, bagasse may partly go to or be taken from the bagasse yard. *Bagasse generated = Cane crush + Water added – Juice* Cane crush is monitored by weigh bridge. Water added and juice are monitored through flow meters. *The above method of monitoring is an*

	approved method of monitoring for sugar industries and is used in preparing the Monthly and Annual manufacturing reports (RT 7c and 8c) that are submitted to the Government of India.
QA/QC procedures	Monitored bagasse data would be cross-checked with RT 8c and 7c reports of the plant. Annual bagasse balance would be prepared to cross-check recorded data. For the period of error, data would be adjusted as described under "Data uncertainties and adjustments".
Reporting	Bagasse data recorded by Engineer - Mech would be reviewed and input to the computer by the Manager – Engineering. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the monthly energy-CDM report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in monitored/recorded values • Monitored data missing During any of the above scenarios, bagasse quantity would be computed as follows: Bagasse consumed = Gross energy generation / Efficiency calculated using latest reliable data

Biomass combusted (outside biomass) – in Tonnes	
Monitoring methods and procedures	This data will be measured as follows: *"Biomass combusted = Biomass purchased – (Opening stock - Closing stock in biomass yard)"* This data is recorded on a daily basis by Engineer – Mech in log books. Biomass purchased is also monitored by weigh bridge. The type of biomass would also be recorded.
QA/QC procedures	Monitored biomass data may be cross-checked with biomass purchase

	invoices. Calibration of weigh bridge would be done annually arranged by the instrumentation incharge. For the period of any error, data would be adjusted as described under "Data uncertainties and adjustments".
Reporting	Biomass data recorded by Engineer - Mech would be reviewed and input to the computer by the Manager – Engineering. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the monthly energy-CDM report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in monitored/recorded values • Monitored data missing During any of the above scenarios, biomass quantity would be computed as follows: Biomass consumed = Gross energy generation / Efficiency calculated using latest reliable data

Moisture content of biomass	
Monitoring methods and procedures	This data will be measured for each type of biomass on a monthly basis by the Lab chemist using the "weights method" (Weighing the sample before and after drying in an oven). The chemist records the data in log books.
QA/QC procedures	Mass balance used in the measurement process is calibrated annually arranged by the instrumentation incharge.
Reporting	Biomass data recorded by chemist would be reviewed and input to the computer by the Lab-in-Charge (LIC). On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM – Engineering.
Data archiving	The AGM (Engg) would verify the monthly energy-CDM report and

	archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • Monitored data missing • Monitoring not done During any of the above scenarios, moisture content would be computed as follows: The least moisture content measured historically for the type of biomass would be considered for that period.

Net Calorific Value of biomass	
Monitoring methods and procedures	This data will be monitored for each type of biomass on a quarterly basis by a third party analysis. The Lab chemist will be responsible for collecting samples and arranging the analysis.
QA/QC procedures	Not applicable
Reporting	Calorific value data recorded by chemist would be reviewed and input to the computer by the Lab-in-Charge (LIC). On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the monthly energy-CDM report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are not likely.

Fossil fuel consumption (Co-fired fuel)	
Monitoring methods and procedures	This data will be measured as follows: *"Fossil fuel combusted = Fuel purchased – (Opening stock - Closing stock in fuel storage)"* This data is recorded on a daily basis by Engineer – Mech in log books. Fossil fuel purchased is also monitored by weigh bridge.

QA/QC procedures	Monitored fossil fuel data may be cross-checked with purchase invoices. Calibration of weigh bridge would be done annually.
Reporting	Fossil fuel data recorded by Engineer - Mech would be reviewed and input to the computer by the Manager – Engineering. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the monthly energy-CDM report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • During error in monitored values • Monitored data missing During any of the above scenarios, the entire quantity of fossil fuel purchased in a particular monitoring period would be considered as combusted in the project plant.

Fossil fuel consumption (on-site)	
Monitoring methods and procedures	This data will be measured in weight or volume meters. This data is recorded on a daily basis by Engineer – Mech in log books. Fossil fuel purchased is also monitored by weigh bridge.
QA/QC procedures	Monitored fossil fuel data may be cross-checked with purchase invoices. Calibration of weigh bridge would be done annually.
Reporting	Fossil fuel data recorded by Engineer - Mech would be reviewed and input to the computer by the Manager – Engineering. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the monthly energy-CDM report and archive it.
Data uncertainties and	For this parameter, data uncertainties are likely during the following

adjustments	scenarios: • During error in monitored values • Monitored data missing During any of the above scenarios, the entire quantity of fossil fuel purchased in a particular monitoring period would be considered as combusted in the project plant.

Net Calorific Value of fossil fuel	
Monitoring methods and procedures	This data will be monitored on a quarterly basis by a third party analysis. The Lab chemist will be responsible for collecting samples and arranging the analysis. If no fossil fuel is consumed during a period, this data will not be recorded.
QA/QC procedures	Not applicable
Reporting	Calorific value data recorded by chemist would be reviewed and input to the computer by the Lab-in-charge (LIC). On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Manager (E) and submitted to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the monthly energy-CDM report archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are not likely.

Distance from biomass sites	
Monitoring methods and procedures	This data will be measured in truck odometers by the truck operators and recorded by the systems department clerk at the weigh bridge. This data is recorded on a continuous basis by the clerk in log books.
QA/QC procedures	Consistency of distance records provided by the truckers will be checked by comparing recorded distances with information from other sources.
Reporting	Distance data recorded by clerk would be reviewed and input to the computer by the Officer – Systems.

	On a monthly basis, a compilation of CDM parameters recorded for the month would be prepared by the Officer and submitted to the Manager – Systems.
Data archiving	The Manager-Systems would verify the monthly report and forward it to the AGM (Engg) for his review and archiving.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • Data missing If data is missing for a particular truck load of biomass, the farthest distance recorded in the past would be assumed.

Truck load -Tonnes	
Monitoring methods and procedures	This data will be measured in KCP SICL weigh bridge and recorded by the systems department clerk at the weigh bridge. This data is recorded on a continuous basis by the clerk in log books.
QA/QC procedures	Weigh bridge would be calibrated annually
Reporting	Truck load data recorded by clerk would be reviewed and input to the computer by the Officer – Systems. On a monthly basis, a compilation of CDM parameters recorded for the month would be prepared by the Officer and submitted to the Manager – Systems.
Data archiving	The Manager-Systems would verify the monthly report and forward it to the AGM (Engg) for his review and archiving.
Data uncertainties and adjustments	For this parameter, data uncertainties are likely during the following scenarios: • Data missing If data is missing for a particular truck load of biomass, the maximum load recorded in the past would be assumed.

Truck mileage

Monitoring methods and procedures	This data will be monitored by the transportation operators. Declaration from the biomass transportation operators would be obtained by the stores department on an annual basis for a sample of the trucks used.
QA/QC procedures	Check consistency of measurements and local / national data
Reporting	Truck mileage data obtained would be reviewed by the Stores department Manager and provided to the AGM (Engg).
Data archiving	The AGM (Engg) would verify the report and archive it.
Data uncertainties and adjustments	For this parameter, data uncertainties are not likely.

Procedures for project performance reviews before data is submitted for internal audit or external verification:

The AGM (Engg) assisted by the Manager (Electrical) and Manager (Engg) would do the project performance review every month based on the monthly energy reports.. A comparison of the daily fuel consumption and energy generation data will be done using MS-Excel. This would reveal the performance of the project activity which would be compared against the expected performance levels. Any discrepancy or deviations would be inspected and traced back to original records and corrective action for that parameter as per the CDM Manual would be done.

Procedures for internal audit and Management review:

An internal audit of the project activity would be done on a half yearly basis during the management review meeting (MRM). The review (audit) team would include at least one technical person and an accounts person. The team would audit the project for the below aspects among other things:

- Are the monitoring of CDM parameters done in line with the CDM PDD and CDM Manual
- Is the documentation of monitored CDM parameters done properly
- Are equipments calibrated and maintained as scheduled
- Is the quantity of CERs generated inline with that projected in the CDM PDD? If not, what are the reasons for deviation?
- Are necessary corrective actions being taken to address deviations?
- Check the authenticity of data monitored and recorded by random cross-checking with other sources.

The audit team would submit their observations to the General Manager (GM) for his review and necessary action. The GM would instruct the CDM Team head (AGM) to take the required corrective action if any suggested by the audit team.

Procedures for corrective actions for better future monitoring and reporting:

Errors or anomalies in the monitoring and reporting would be identified by the AGM (Engg) while reviewing the monthly CDM reports. A comparison of these reports would reveal any data errors or missing data or other anomalies. Errors or deviations will also be identified during the half yearly review/internal audits. The CDM team Head would take up these matters during the monthly CDM Team meeting (that normally would happen a few days after monthly CDM reports are prepared and submitted). The root cause of these errors would be discussed and appropriate action would be taken for better future monitoring and reporting. The corrective actions may include:

- Training of monitoring personnel where required
- Replacement or repair of equipment

Procedures for training of monitoring personnel:

- An initial training would be provided by the CDM consultant to all the monitoring personnel identified before commencement of the CDM crediting period. Detailed monitoring procedures for each of the CDM parameters would be elaborated.
- Subsequent to the training program, the consultant would witness the actual monitoring on site and help with any difficulties faced by the personnel.
- The CDM – Head would closely inspect the monitoring activities till the mechanism works smoothly.
- Any new person joining the team would be trained on the job by the person being replaced.

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.

CDM Team meeting:

The team meets once a month to review the CDM performance of the plant. Any particular concerns are discussed and appropriate action is taken.

Annex 5

BASIS OF FINANCIAL PROJECTIONS

DESCRIPTION	Rs. In Lakhs
INSTALLED PROJECT COST	2100.00
INTERNAL ACCRUALS	2100.00
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		140
NET SALABLE POWER QUANTITY (KW)		5500
NET SALABLE POWER QUANTITY PER SEASON IN kWhs		
	BELOW 55% PLF	10164000
	ABOVE 55% PLF	4620000
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		42.00

ANNUAL ESCLATION IN REPAIRS AND MAINTENANCE IN %	4.00
SALARIES AND WAGES (Rs. IN LAKHS)	5.50
ANNUAL ESCALATION OF SALARIES AND WAGES IN %	10.00
ADMINISTRATIVE EXPENSES (RS. IN LAKHS)	8.00
ANNUAL ESCALATION OF ADMINISTRATIVE EXPENSES IN %	5.00
INSURANCE ON FACTORY ASSETS @ 1% ON PROJECT COST	21.00
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
- 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
- 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.mnes.nic.in
- www.cea.nic.in
- Power purchase agreement with APTRANSCO/APSPDCL
- Purchase order for turbo generator
- Feasibility study
- Consent order for operation of the power plant from APPCB
- 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