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

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Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

>> Biomass Residue based Power Generation at Shree Doodhganga Krishna SSK Niyamit (SDKSSKN), Karnataka, India.

Version 01

01/12/2007

A.2. Description of the project activity:

>> The Project activity is a biomass residues (Bagasse) based power generation(cogeneration) project at Shree Doodhganga Krishna SSK Niyamit (SDKSSKN), Karnataka, India. The bagasse used for the cogeneration, is available as a waste stream from SDKSSKN's agro-industrial unit, the sugar industry located within the same premises, which is having a crushing capacity of 5000 TCD

The project activity involves the installation of a new biomass residue fired power plant, which is operated next to (an) existing biomass residue fired power plant(s). The existing plan has been fired with biomass residues, and but got retired after the installation of the new power plant. The maximum power generation capacity of the cogeneration is about 20 MW. **Part of the power generated is used for on site power requirement and** the surplus, is evacuated to the electricity grid, and this export(sale) of the electricity to KPTCL is governed **through a Power Purchase Agreement (PPA) contract**. The exportable power ranges from 14 MW during the peak season to 18 MW during off-season. The project activity is contributing to the substitution of power and steam generation with fossil fuels by energy generation with biomass residues, and thereby reducing mainly CO2 emissions.

Prior to the project activity, SDKSSKN had been possessing power generation capacity with a setup of low-pressure boilers, and was not exporting power to the grid. SDKSSKN, keeping in mind the potential CDM revenue decided to invest in the present modernized biomass residues based cogeneration system and a grid connection that will allow evacuation of surplus power to the Karnataka State grid system. The pre project (historical) cogenenration scenario at SDKSSKN had been as explained below:

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Table 1: Phase-wise power and crushing capacity expansion

Year of expansion	Crushing capacity	Boiler configuration	Turbine configuration
Pre-project activity			
1974	1250 TCD	Two (20 TPH , L.P. Boilers)	1.5 MW Turbine
1985	2000 TCD	Addition of One (20 TPH , L.	Addition of 2.5 MW Turbine

		P. Boiler)	(1.5 MW turbine kept as standby)
1995-96	3500 TCD	Addition of One (40 TPH, H. P. Boiler)	2.5 MW +1.5 MW (both turbines were being used)
Current project activity			
2004	5000 TCD	1 (125 TPH, H. P. Boiler) (The old three 20TPH boilers have been taken out from operation. The 40TPH boiler is used for steam for driving sugar mill.)	20 MW (2.5 MW & 1.5 MW turbines sold)

A.3. Project participants:

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Name of the party involved (host) indicates a host party	**Private and/or public entity (ies) project participants as applicable**	**Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)**
Government of India (host)	Shree Doodhganga Krishna Sahakari Sakkare Karkhane Niyamit (SDKSSKN) Co-operative Sugar Factory located at Nanadi, Chikodi taluka, Belgaum District, Karnataka, India	No

SDKSSKN shall be the lead and nodal entity for all communication with CDM – EB and Secretariat. Contact information is provided in Annex I. This project has been developed as a CDM project and expects other entities from Annex I countries to join as project participants at a later stage. The list of such participants will be provided as and when identified. The contact details of project participants have been provided at Annex 1.

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):

>> India

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

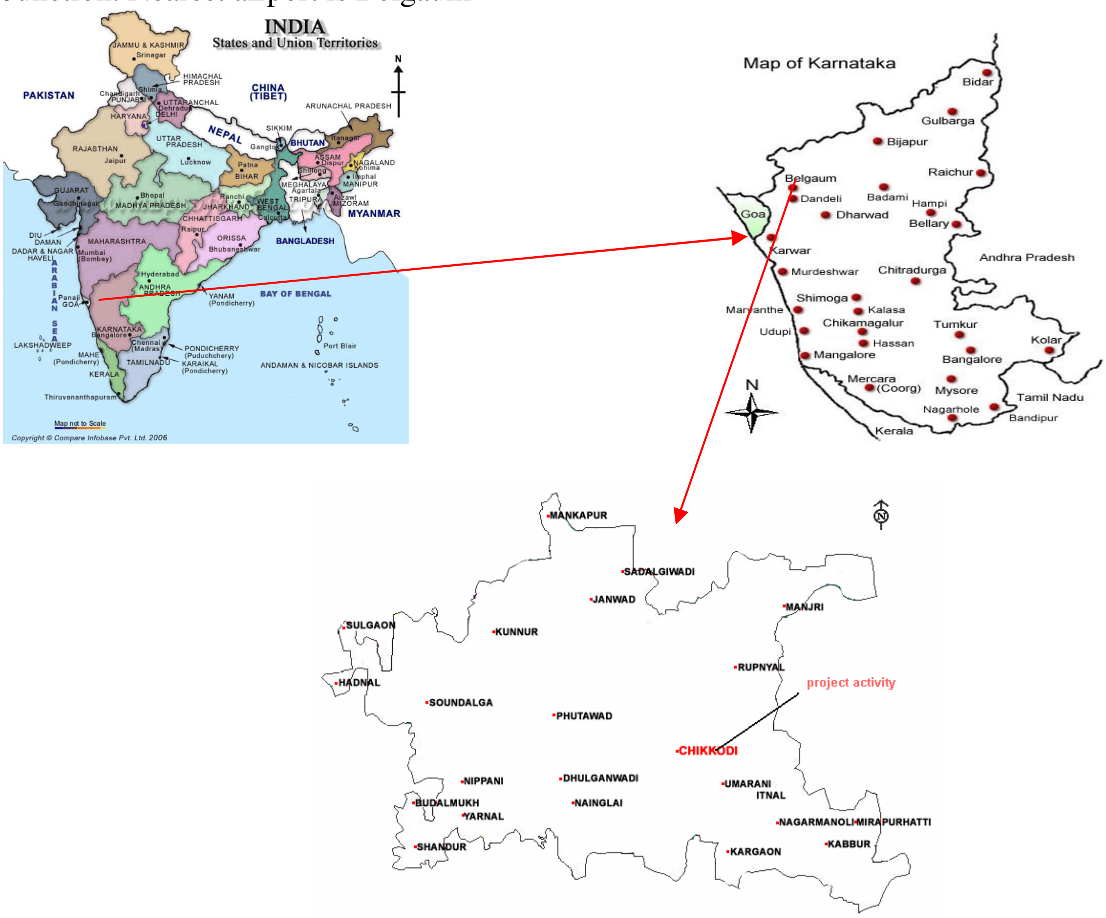
>> State of Karnataka

A.4.1.3. City/Town/Community etc:

>> **District:** Belgaum
Taluka: Chikodi
Village: Nanadi

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

>>The biomass residues based cogeneration power plant is located in the village Nanadi in the Taluka of Chikodi in Belgaum District of Karnataka State .Chikodi taluka is at the border of Karnataka-Maharashtra. It is 70 Km from the city of Belgaum. The Belgaum district is located in the north western part of the state of Karnataka, in the southern region of India. It lies at the border of the two Indian States of Maharashtra and Karnataka. It lies between 15°23″N and 16°58″N latitudes and 74° 5 ″E and 75° 28″E longitudes. The nearest railway station is Miraj Junction. Nearest airport is Belgaum



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

>>As per the scope of the project activity enlisted by UNFCCC-CDM –EB in the 'list of sectoral scopes and approved baseline and monitoring methodologies', the project activity may principally be categorized in Scope Number 1, Sectoral Scope - Energy industries (renewable/ non-renewable sources

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

>> The power generation from the project activity is based on the predominant technology "Steam-Rankine cycle". The project proponent had three alternatives to procure a steam turbine

1. *Straight back pressure*
2. *Extraction cum condensing*
3. *Double extraction cum condensing*

As the option 3, allows maximizing the power exports to grid it was selected for the current cogeneration scheme.
SDKSSKN is a biomass residues based cogeneration power plant and it involves the installation of a new biomass residue fired power generation unit, which is operated next to existing power generation capacity fired with the same type of biomass residue as in the project plant.

<u>Technical specification of the existing units (retired due to the project activity) is as follows:</u>

1) Existing Boiler (Type – Dumping grate, bagasse fired, high pressure)
Steam Output – 40 TPH
Steam pressure – 45 kg/cm2
Steam temperature – 450 Degree Centi

<u>Technical specification of the key units in the project activity (new cogeneration scheme) is as follows:</u>

1) New additional Boiler (Type – multi-fuel, travelling grate, high pressure)
Steam Output – 125 TPH
Steam pressure – 66 kg/cm2 (67 Bar level)
Steam temperature – 495 ± 5ºC

2) Steam turbine (Type – Double extraction cum condensing)
Capacity – 20 MW

All steam required for process at 7 kg/cm2 will be generated in the 66 kg/cm2, 495 ±5ºC bagasse fired boiler. Steam required at 7 kg/cm2 for process will be drawn by uncontrolled extraction in the steam turbine. Steam required at 1.5 kg/cm2 for process and de-aerator will be obtained from existing mill drive turbines and 20 MW new steam turbine controlled extraction point.

The project activity is installed with appropriate power evacuation system and related instrumentation and controls. Adequate thermal, electrical insulation and soundproof barriers are built into the project. To maintain stringent qualities of feed water, a demineralization plant is also included in the project. The cogeneration plant is installed with modern safety features and pollution control systems to ensure environmentally safe and sound technology.

Energy conservation measures being taken at the plant:

a) Variable frequency drives (VFD) for following units to reduce in house power consumption.
   - ID Fan – 180KW - 2 Nos
   - FD Fan- 90 KW 2 Nos
   - Bag. Drum Feeder – 3.7 KW - 6 Nos

b) Counter flow cooling tower to reduce re circulating water with low power consumption.

c) Belt conveyers are installed instead of slat conveyers, which reduce power consumption & minimize maintenance work.

d) Soft starter provided for main cooling tower pump to reduce the power demand.

The novel practices in the proposed project activity are as follows:

a) Turbine is having double extraction cum condensing for better efficiency and flexibility to switch over for condensing mode whenever sugar process does not require steam. So that maximum plant load factor can be maintained.

b) High pressure boiler

c) DISTRIBUTED CONTROL SYSTEM (DCS) for remote control and management of the power plant. DCS provides with features of automatic data logging, observation from Control Room performance status of boiler, turbine, and power generation.

d) Demineralization plant with weak base anion to take care of high pressure boiler feed water.

e) Travelling grate for boiler for better combustion efficiency & reduced un burnt loss.

f) Auto water dumping system to avoid contaminated return condensate water to boiler.

g) HP heater is provided at feed water inlet line to increase feed water temperature up to 160^0c, which improves boiler efficiency, increased evaporation rate in boiler & increased overall thermal cycle efficiency.

h) Provision of on line bagasse belt-weighing system to enable automatic monitoring of the consumption of bagasse in the boiler.

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

>> The total estimated emission reduction over the entire crediting period of ten years is 478240 tCO2e.

Year	**Annual estimation of emission reductions in tonnes of CO2 e**
Year 1	47824
Year 2	47824
Year 3	47824
Year 4	47824
Year 5	47824
Year 6	47824
Year 7	47824
Year 8	47824
Year 9	47824
Year 10	47824
Total estimated reductions	478240
Total number of crediting years	**10**
Annual average over the crediting Period	47824

A.4.5. Public funding of the project activity:

>> The project has not received any public funding. The investment made in the project activity is sourced as loan from financial institution, HUDCO (Housing & Urban Development Corporation Ltd).

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:

>> The name of the approved baseline methodology applied to the project activity is:

- *"Consolidated methodology for grid-connected electricity generation from biomass residues"* ACM0006 / Version 06; EB33
- The methodology also refers to latest approved version of ACM0002 "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*" (ACM0002 /Version 07),
- And latest approved version of Methodological Tool: "Tool for the demonstration and assessment of additionality (version 04), EB 36"

ACM0006, Version 6 refers to the below given tools. The tools used in the PDD, and the reasons if any of these referred tools is not used are also explained below.

Tool to determine methane emission avoided	Tool not used Methane emissions from uncontrolled combustion of biomass residues do not occur in the project activity, and hence the tool is not included in the project activity Refer B.6
Combined Tool to identify the baseline and demonstration of additionality	Not used Tool for the demonstration and assessment of additionality(version 04), EB 36" is used . "Combined Tool to identify the baseline and demonstration of additionality methodologies (Version 02.1) EB 28" says that methodologies using this tool are not applicable to project activities where one or more alternative scenarios to the proposed project activity are not available options to the project participant. The project acivity does have alternative scenarios that are not available options to the project participant
Tool to calculate project/leakage CO2 emission	Yes, used. Refer B.6.
Tool to calculate project emission from electricity consumption.	Not used. No electricity is used for activities attributable to the project activity. Hence $PE_{EC,y}$ =0.0; and no tool is used Refer B.6.1

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

>> The applicability conditions from ACM0006 (Version 06) are mentioned below and the justifications for the applicability of the project activity to these are given next to the each applicability condition

This methodology is applicable to biomass residue fired electricity generation project activities, including cogeneration plants.
The project activity may include the following activities or combinations of these activities:
The installation of a new biomass residue fired power plant, which replaces or is operated next to existing power plants fired with either fossil fuels or the same type of biomass residue as in the project tplant (power capacity expansion projects); or

⇒ Project activity is a cogeneration plant fired with biomass residues. Biomass residues used are mainly Bagasse (own and purchased). SDKSSKN's cogeneration plant uses certain amount of cane trash which is also biomass residue. As permitted by the methodology ACM0006 Ver06, the project activity uses coal for the purpose of co-firing. Both during season and off season, only biomass residues are used
⇒ According to the methodology, ACM0006 Ver06, SDKSSKN's project activity is a **power capacity expansion project**. Project activity is a new biomass residue fired power generation unit, which replaces the existing power generation which was being also fired with biomass residues as in the project plant. Thus, the project activity is, as per the methodology, a **power capacity expansion project**.

The pre project (historical) cogenenration scenario at SDKSSKN had been as explained below:
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Table 1: Phase-wise power and crushing capacity expansion

Year of expansion	Crushing capacity	Boiler configuration	Turbine configuration
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1974	1250 TCD	Two (20 TPH , L.P. Boilers)	1.5 MW Turbine
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1995-96	3500 TCD	Addition of One (40 TPH, H. P. Boiler)	2.5 MW +1.5 MW (both turbines were being used)
The project activity			
2004	5000 TCD	1 (125 TPH, H. P. Boiler)	20 MW (New turbine

		(The existing 20TPH boilers have been sold. The existing 40TPH boiler is taken out of cogeneration and being used for steam generation for driving sugar mill drive, and hence new 125TPH replaces the existing boilers.)	replaces the existing 2.5 MW & 1.5 MW; the existing turbines are sold)

Document used:

- Purchase Agreement of the new Boiler, Tubine, and auxiallay and grid interfacing equipments constituting the new grid connected cogeneration plant
- Evidences relating to the sale of old boilers and turbine

The methodology is applicable under the following conditions:

1) 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);

2) 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;

3) The biomass residues used by the project facility should not be stored for more than one year;

4) No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils) are not eligible under this methodology

Each of the just above cited applicability conditions is repeated again below in order to give justification against each one

1) ***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);***

The project activity uses bagasse as the primary and predominant fuel. **During season, t**he source of the entire bagasse is from SDKSSKN's sugarcane crushing mill located in the same premises. During the off season project activity uses the stored bagasse, procured bagasse from nearby sugarcane mills, and cane trash purchased from nearby sugar cane fields. Certain minimal amount of coal, the, fossil fuel, may be co-fired in the boiler as an emergency backup fuel, which is less than 4% of the total fuel quantity.

Thus no other biomass types other than biomass residues are used as predominant fuel in the project activity.

Documents used to demonstrate that bagasse is the predominant fuel:

- Boiler and Turbine specifications
- Bagasse generation data from SDKSSKN's sugar Industry
- Procurement data for the purchased bagasse, and sugar cane trash
- Procurement data for the purchased coal for co-firing

Availability of excess baggase

About ten sugar factories (running without co-generation) are situated near the SDKSSKN project plant. In these sugar industries baggase saving per ton of cane is around 4% on cane. Hence, excess baggase is available with them for sale to the other sugar industries involved into surplus power generation and export

*2) **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 bagasse from SDKSSKN's 5000TCD crushing facility at the sugar factory is the main source of biomass residues that are being used for power generation**.** Implementation of the project activity would not result in the increase of the processing capacity of the raw input in the facility.

Evidence:
(*Licensed Crushing capacity of the plant at the start of the project activity (time of power capacity expansion) and the current year's crushing capacity(the crushed quantity, can be cross verified). These documents are available for verification by the DOE)

*3) **The biomass residues stored at the project facility should not be stored for more than one year:***

During the season (average of 180-200 days), the generated bagasse from the sugar industry is continuously being served for cogeneration and the excess bagasse is stored. During off-season the stored bagasse and procured bagasse are used for power generation for a maximum of four months; always the practice is to use the stored bagasse during the initial period of the off season. Thus, in any case the saved or procured bagasse are used completely during the off season period of four months, thus total storage of the saved bagasse do not exceed more than one year. In addition, the storage facility do not permit to store bagasse beyond the off season cogeneration operating period, mainly due to the onset of the rainy season during the end of off season.

Documents used:

- Electricity Generation showing the time periods of generation and export during the entire year
- Bagasse Generation,utilization and balance(at the end of season and off season)
- Bagasse stock inventory

4) • No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils).

As the cogeneration plant is situated adjacent to the SDKSSKN's sugar mill in the same premises, the bagasse produced in the sugar mill during season is fed directly to the cogeneration unit through conveyor belts. No processing of the bagasse is carried out before combustion, and hence no related fuel/ energy usage.. Similary duuring off season, with regard to the biomass residues which are procured from outside, no processes is carried out on them before combustion. Energy is utilised for only the transportation of these procured biomass residues. from nearby sugar mills or neighbouring sugarcane fields, which is permitted as per the methodology.

It is further noted that the methodology is only applicable for the combinations of project activities and baseline scenarios identified in table below.

It is further noted that the methodology is only applicable for the combinations of project activities and baseline scenarios identified in Table 1 below.

(Please note that the table shown below reproduces the applicable scenario from the twenty scenarios given in from Table 1 in the methodology ACM0006 ver 06)

Scenario	Project Type	Baseline Scenario P2&P4	Description of the situation
11	**Power Capacity Expansion Projects**	**P2&P4; B4; H5**	***The project activity involves the installation of a new biomass residue fired power plant, which is operated next to (an) existing biomass residue fired power plant(s). The existing power plant(s) are only fired with biomass residues. After the implementation of the project activity, the existing power plant(s) either (a) continue to operate next to the new power plant (e.g. as back-up plant) or (b) could continue to be operated (i.e. the plant(s) are fully operational and have a remaining technical lifetime) but are retired due to the installation of the new biomass residue fired power plant. The efficiency of electricity generation is higher in the new power plant than in the***

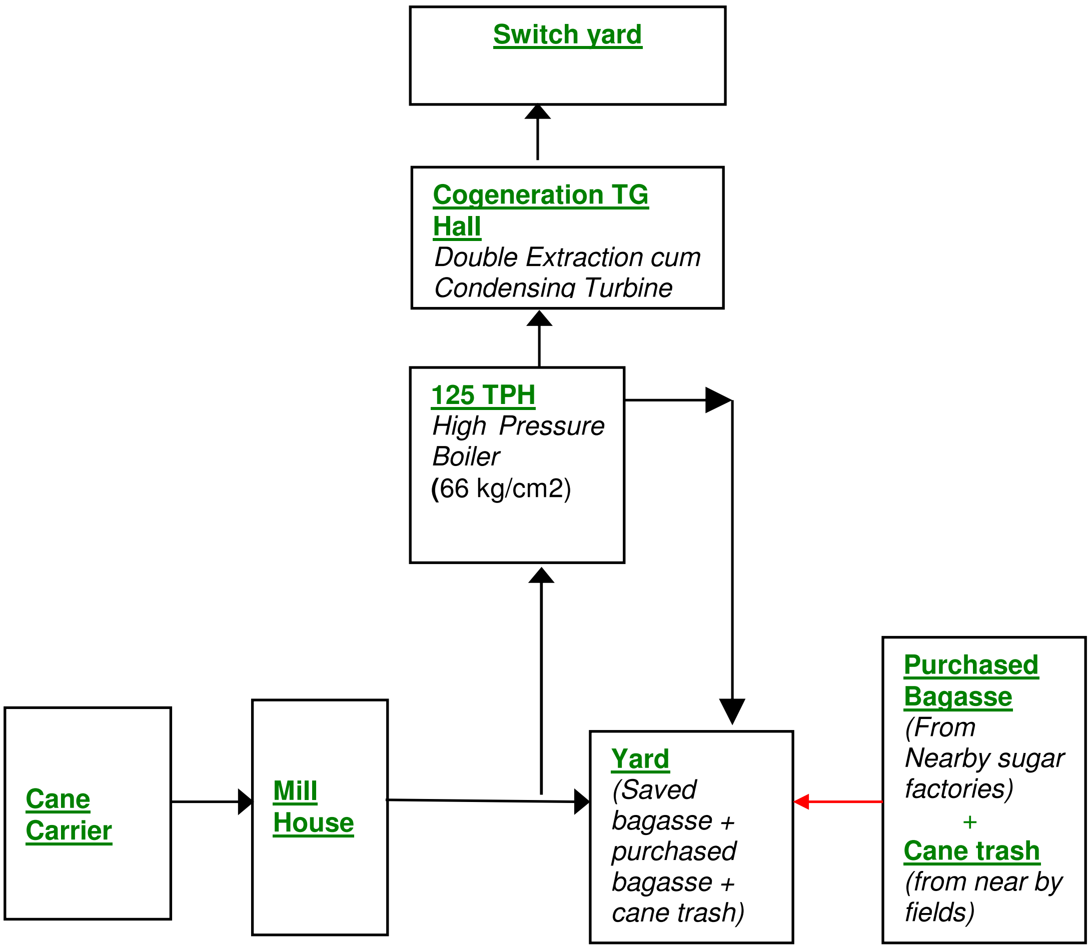
			existing plant(s). The biomass residues would in the absence of the project activity be used in the existing power plant(s) at the project site. Consequently, the power generated by the new power plant would in the absence of theproject activity be generated (a) in the existing plant(s) and – since power generation is more efficient in the project plant than in the existing plant(s) – (b) partly in power plants in the grid. In case where the project plant is a cogeneration plant, the following conditions apply: The existing power plant(s) are also cogeneration plants; the heat generated by the project plant would in the absence of the project activity be generated in the existing cogeneration plant(s); the efficiency of heat generation in the project plant is smaller or the same compared to the existing cogeneration plant(s).

Project activity confirms to one of the scenario listed in the Table 1, namely Scenario 11 as required by the applicability condition, which is reproduced above. Table 1 in ACM0006 ver 06 gives twenty scenarios. Amongst them scenario numbered 11 is applicable to the project activity as explained below:

- The project activity involves the installation of a new biomass residue fired power unit, which is operated next to (an) existing biomass residue fired power generation unit(s). ***The existing power plant(s) are only fired with biomass residues. After the implementation of the project activity, the existing power plants) could continue to be operated (i.e. the plant(s) are fully operational and have a remaining technical lifetime) but are retired due to the installation of the new biomass residue fired power plant.*** Hence, SDKSSKN's project activity is a power capacity expansion project as applicable to scenario 11
- the power generated by the new power plant would ***in the absence of the project activity be generated (a) in the existing plant(s) and – since power generation is more efficient in the project plant than in the existing plant(s) – (b) partly in power plants in the grid***
- The efficiency of electricity generation is higher in the new power plant than in the existing plant(s). The biomass residues would in the absence of the project activity be used in the existing power plant(s) at the project site
- The heat generated by the project plant would in the absence of the project activity be generated in the existing cogeneration plant(s)
- According to the methodology,(explained at section B 5), baseline scenarios for the project activity are: P4 and P2 for power, B4 for bagasse and H5 for heat.

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

>> **Project Boundary**



Gases included within the project boundary

	Source	Gas	Status	Justification/Explanation
Baseline	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	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. This is Conservative
		N_2O	Excluded	Excluded for simplification. This is Conservative
	Uncontrolled burning or decay of surplus biomass residues	CO_2	Excluded	Excluded for simplification. This is Conservative
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification. This is Conservative
Project activity	On-site fossil fuel and electricity consumption due to the project activity (stationary or mobile)	CO_2	Included	As the project activity uses fossil fuel for co-firing and also imports
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Off-site transportation of biomass residue	CO_2	Included	Bagasse will be transported from outside for meeting the plant's off-season power generation .
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small.
	Combustion of biomass residues for electricity generation and/or heat generation	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small.
	Storage of biomass residues	CO_2	Excluded	Excluded for simplification. Since the biomass is not stored for more than 1 year, this emission source is assumed to be small.

		CH4	Excluded	Excluded for simplification. Since the biomass is stored for not longer than 1 year, this emission source is assumed to be small.
		N2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.

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

>> ***Identification of baseline scenario***

As per the methodology, realistic and credible alternatives should be separately determined regarding:

- How **power** would be generated in the absence of the CDM project activity;
- What would happen to the **biomass residues** in the absence of the project activity; and
- How the **heat** would be generated in the absence of the project activity.

The alternatives in each case and the explanation regarding identification of baseline scenario is presented in the Table 1 given below

Table 1: Realistic and credible alternatives for power, biomass residue, steam and identification of the most plausible baseline scenario

Reference no for the alternatives (1)	Realistic and credible alternatives (2)	Remarks on exclusion/identification of the alternative (3)	Identified Baseline Scenario (4)
POWER			
P1	The proposed project activity not undertaken as a CDM project activity	Proposed project activity faces barriers as discussed further in section B.5 that revent from ocuuring.. Project activity being only as a CDM activity is feasible.	Excluded as baseline scenario
P2	The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired	The continuation of operation of existing cogeneration plants at site, without retrofitting, is business as usual, and would meet the process	IDENTIFIED BASELINE SCENARIO

	with the same type of biomass residues as (co-)fired in the project activity.	onsite power (also heat) requirements of the industry. Usage of own biomass as fuel leading to no fuel cost. Most credible and feasible scenario. Hence is the baseline scenario	
P7	The **retrofitting** of an existing biomass residue fired power, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case.	The power and heat generated in this retrofitted plant having a lower efficiency of electricity generation than the project plant would meet only the onsite power and process heat requirements, which are already met by the existing plants. The existing plant still does have sufficient life time. Though retrofitting of the existing plants may provide with cogen with longer life time than the existing plants, retrofitting would attract investment. This scenario is not a baseline scenario	Excluded as baseline scenario
P4	The generation of power in the grid	In absence of project activity, the equivalent power exported by project activity would be generated in existing and/or new grid connected power plants. Hence, it is one of the credible baseline scenario.	IDENTIFIED BASELINE SCENARIO
STEAM			
H1	The proposed project activity not undertaken as a CDM project activity	Proposed project activity faces barriers as discussed in section B.5 which the prevent the project activity	Excluded

		to occur. Project activity viable only as a CDM activity. hence, it cannot be taken as baseline scenario.	
H3	The generation of heat in an existing captive cogeneration plant, using only fossil fuels	Use of coal for heat generation would lead to higher baseline emissions. Also the scenario is economically unattractive . a scenario of generating heat using own bagasse generated in the same premise, would be more feasible and attractive. Hence this scenario cannot be taken as baseline scenario.	Excluded
H4	The generation of heat in boilers using the same type of biomass residues	Installation of separate boilers for heat generation using biomass residues would be requiring additional investments, technical and management efforts for the requirement of industry's power i.e. a separate power plant or import of electricity from grid is required. Generation from the existing cogeneration facility, along with power generation is technically better option which leads to minimization and optimization of investments, technical efforts and skills Hence this scenario of heat generation cannot be taken as baseline scenario.	Excluded
H5	The continuation of heat generation in an existing biomass residue fired cogeneration plant at the	The continuation of operation of existing cogeneration plants alone at site, without the	IDENTIFIED BASELINE SCENARIO

	project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as in the project activity	implementation of project activity, is business as usual, and would meet the process heat and onsite power requirements of the industry. Hence, most credible and feasible baseline scenario.	
H6	The generation of heat in boilers using fossil fuels	Installation of separate boilers for heat generation using fossil fuel would be requiring additional investments, technical and management efforts for the requirement of industry's power needs i.e. a separate power plant or import of electricity from grid is required. Further, fossil fuels would require continuous operational expenditure towards fossil fuel costs. Also it usage of fossil fuel would lead to higher baseline emissions and hence not feasible scenario and hence not a baseline scenario	Excluded as baseline scenario
H7	The use of heat from external sources, such as district heat	There is no district heating system provided in the region and hence, it cannot be taken as baseline scenario.	Excluded as baseline scenario
H8	Other heat generation technologies	Installation of separate technologies for heat generation would be requiring additional investments, technical skills and efforts, Generation from existing cogeneration facility along with power generation is technically better option as	Excluded as baseline scenario

		well as a better investment option , and also leads to minimization and optimization of technical efforts and skills. In the case of a H8 scenario, for the requirement of power, a separate power plant or import of electricity from grid is also required to meet the industry's requirement of power. Hence this scenario of heat generation technologies cannot be taken as baseline scenario.	
BIOMASS RESIDUES			
B1	The biomass residues are dumped or left to decay under mainly aerobic conditions.	Bagasse generated by sugar mills in the region is a useful resource and is not dumped or left to decay under aerobic conditions. As a prevailing practice in the region, the bagasse is used as fuel in boilers for process heat or/and for power generation for onsite requirements or. sold to the sugar mills which export power to the grid. Hence, hence the scenario is not a baseline scenario.	Excluded as a baseline scenario
B2	The biomass residues are dumped or left to decay under clearly anaerobic conditions.	Bagasse generated by sugar mills in the region is a useful resource and is not dumped or left to decay under anaerobic conditions. As a prevailing practice in the region the bagasse is used as fuel in boilers for process heat or/and for	Excluded as a baseline scenario

		power generation for onsite requirements or. sold to the sugar mills which export power to the grid. Hence, hence the scenario is not a baseline scenario.	
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	Bagasse generated by sugar mills in the region is a useful resource and is not burnt in an uncontrolled manner without utilizing it for energy purposes. As a prevailing practice in the region the bagasse is used as fuel in boilers for process heat or/and for power generation for onsite requirements or. sold to the sugar mills which export power to the grid. Hence, hence the scenario is not a baseline scenario.	Excluded as a baseline scenario
B4	The biomass residues are used for heat and/or electricity generation at the project site.	In absence of project activity, biomass would have been used for heat and electricity generation in a cogeneration system with low pressure boilers at the project plant. Hence, can be considered as one of the credible baseline scenario.	IDENTIFIED BASELINE SCENARIO
B5	The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plants	To meet its electricity and heat requirements, SDKSSKN would have used the biomass at site in a new cogeneration system with lower efficiency than project plant. Hence, it cannot be	Excluded as a baseline scenario

		considered as one of the credible baseline scenario.	
B6	The biomass residues are used for heat generation in other existing or new boilers at other sites	To meet its electricity and heat requirements, SDKSSKN would have used the biomass at site in a new cogeneration system with lower efficiency than project plant. Hence, it cannot be considered as one of the credible baseline scenario.	Excluded as a baseline scenario
B7	The biomass residues are used for other energy purposes, such as the generation of bio fuels	To meet its electricity and heat requirements, SDKSSKN would use the biomass at site in a new cogeneration system with lower efficiency than project plant. Also using bagasse the biomass residues used in the project activity , generation of biofuel is not a technically proved method in the region. Hence, B7 cannot be considered as baseline scenario.	Excluded as a baseline scenario
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)	Using the biomass residues to meet its electricity and heat requirements is more a prevalent practice in the sector in the region. Requirements for utilizing it for non-energy purposes are not available in the region. . Hence, it cannot be considered as one of the credible baseline scenario.	Excluded as a baseline scenario

Description of the Baseline Scenario:

The identified most plausible baseline scenario for power, steam and baseline are shown above. The baseline scenario for this project activity is

The biomass residues would in the absence of the project activity be used in the existing power plant(s) at the project site. Consequently, the power generated by the new power plant would in the absence of the project activity be generated (a) in the existing plant(s) and– (b) partly in power plants in the grid. The power generation is more efficient in the project plant than in the existing plant(s). The existing power plant(s) are also cogeneration plants; the heat generated by the project plant would in the absence of the project activity be generated in the existing cogeneration plant(s); the efficiency of heat generation in the project plant is smaller or the same compared to the existing cogeneration plant(s). (the heat generated per biomass input in the project plant is the same compared to the reference plant)

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): >>

The baseline scenario for the project activity is explained
In the absence of the project activity the scenario of power and heat generation and usage of the bio mass residues are as explained below: power generation would be occurring in the existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-)fired in the project activity. ***Consequently, the power generated by the new power plant would in the absence of the project activity be generated (a) in the existing plant(s) and– (b) partly in power plants in the grid. The existing power plant(s) are also cogeneration plants; the heat generated by the project plant would in the absence of the project activity be generated in the existing cogeneration plant(s). The biomass residues would in the absence of the project activity be used in the existing power plant(s) at the project site.***

As the power requirement from the southern states is increasing annually, in the absence of the project activity, certain part of the power generated by the project activity would have been generated by southern grid using the existing power plants and similar additions. Since, the generation from the project activity is biomass residue based and generation of power based on biomass residue does not result in GHG emissions, the project activity will reduce the GHG emissions in relation to the GHG emissions from the sources connected to the southern grid.

Further in this section, demonstration of how the anthropogenic emissions of GHG by sources corresponding to baseline scenario are reduced by the project activity is made:

Looking at power situation in the state of Karnataka it can be seen that though power availability has increased by over 5,400 MW since 1980, the deficit in peak hour demand and annual energy requirements has been almost continuous. During the year 2005-06 peak hour demand and annual energy requirements were 9.8% and 0.74% respectively.

Electricity Demand and shortage in Karnataka :(April 2005 - March 2006)

Peak Demand Shortage	602 MW (against 6,160 MW)	9.8 %
Energy shortage	251 MU (against 34,578 MU)	0.74 %

(Source: Ministry of Power, Govt. of India)

With energy shortage looming ahead, Karnataka is desperately scouting for power. Karnataka's daily power requirement at present is about 105 MU. But the availability is about 80 MU, inclusive of purchases from the central sector. There was an 8.5 per cent peak deficit (the maximum deficit during a particular period of time during the day) and a 2 per cent base deficit. The situation worsens when irrigation demand picks up.

Thermal generation operates at a plant load factor of 93 per cent and feeds approximately 36 million units in the grid. But despite this high thermal generation and alternative supplies, the State was likely to face a peaking deficit in excess of 10 per cent on account of the irrigation load.

The load forecast for the Karnataka state till year 2016 indicates that it is a modest increase of about 7% annually. If all the additional peak demand (MW) were to be met by state's own generation, *installed capacity of the state has to be doubled.*

Load forecast for Karnataka

Year	**2006-07**	**2011-12**	**2016-17**
Peak Demand (MW)	7,740	10,460	14,071
Annual Energy (MU)	44,748	60,478	81,354

(Source: 16th Annual Power Survey, CEA)

For Karnataka, which has no known reserve of fossil fuels, this means setting up of a number of coal fired power stations at a huge cost to the society, because of the stiff opposition to hydro electric power plants on socio-environmental grounds.

In this regard, one very significant the realistic solution to meet the electricity demand is to have maximum deployment of new and renewable energy technologies. Project activity is one such where waste to energy technology is applied using mainly the biomass residues Bio mass is generated from an agro industrial unit the waste from agriculture activities. Project activity faced many barriers and in this context the development and successful implementation of is additional in many respects. The additionality is demonstrated in the followings sections through various steps confirming to the approach of the approved tool prescribed by the UNFCCC CDM-EB

Demonstrating the additionality of the project

As per 17/CP.7, a project will be defined additional if the anthropogenic GHG emissions from the source are reduced below that would have occurred in the absence of the registered project activity

Within the scope of the adopted baseline methodology, the additionality of the project activity has been demonstrated and assessed using the latest approved version of "Tool for the demonstration and assessment of additionality (version 04), EB 36"

Step 1

Identification of alternatives to the project activity consistent with current laws and Regulations

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

<u>Requirement</u>

1. *Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. These alternatives are to include:*
   - *The proposed project activity not undertaken as a CDM project activity;*
   - *All other plausible and credible alternatives to the project activity that deliver outputs and on services (e.g. electricity, heat or cement) with comparable quality, properties and application areas;*
   - *If applicable, continuation of the current situation*

<u>Project Characteristics</u>

CDM project activity does not include several different facilities, technologies, outputs or services,

In the present CDM activity of biomass (bagasse) based cogeneration, alternatives have been defined regarding:
_ how **power** would be generated in the absence of the CDM project activity;
_ what would happen to the **biomass residues** in the absence of the project activity; and
_ how the **heat** would be generated in the absence of the project activity.

The realistic and credible alternatives, separately in case of power, heat and biomass residues are shown at column 2 in the Table 2.(Same as given in the Table 1)
Table 2: Realistic and credible alternatives for power, bio mass residue and steam

Reference no for the alternatives (1)	**Realistic and credible alternatives (2)**
P1	The proposed project activity not undertaken as a CDM project activity
P2	The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-)fired in the project activity.
P7	The **retrofitting** of an existing biomass residue fired power, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case.
P4	The generation of power in the grid
STEAM	
H1	The proposed project activity not undertaken as a CDM project activity
H3	The generation of heat in an existing captive cogeneration plant, using only fossil fuels
H4	The generation of heat in boilers using the same type of biomass residues
H5	The continuation of heat generation in an existing biomass residue fired cogeneration plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as in the project activity
H6	The generation of heat in boilers using fossil fuels

H8	Other heat generation technologies
BIOMASS	
B1	The biomass residues are dumped or left to decay under mainly aerobic conditions.
B2	The biomass residues are dumped or left to decay under clearly anaerobic conditions.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.
B4	The biomass residues are used for heat and/or electricity generation at the project site
B5	The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plants
B6	The biomass residues are used for heat generation in other existing or new boilers at other sites
B7	The biomass residues are used for other energy purposes, such as the generation of bio fuels
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)

Outcome of Step 1a:

Identified the realistic and credible alternative scenario(s) to the project activity

Sub-step1b: Consistency with mandatory laws and regulations:

<u>Requirement</u>

2. The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. This sub-step does not consider national and local policies that do not have legally-binding status.

3.If an alternative does not comply with all applicable legislation and regulations, then show *that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread in the country. If this cannot be shown, then eliminate the alternative from further consideration*

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4. If the proposed project activity is the only alternative amongst the ones considered by the project participants that is in compliance with all regulations with which there is general compliance, then the proposed CDM project activity is not additional.

Project Characteristics

All the alternative(s) are in compliance with all applicable legal and regulatory requirements. Mentioned below is the list of approvals obtained for the proposed project activity

1) ***The government of Karnataka NOC No. DE 18 NCE 2000 Bangalore dated 7/11th April 2000***
2) ***Consent for operations from State Pollution control Board (KSPCB) as Water and Air Acts***
3) ***Consent from Corporation for installation 110 KV evacuation line from Plant site to nearest sub-station of the Corporation including right of way***
4) ***Permission from the Irrigation Dept, Government of Karnataka for lifting of water from Krishna river***
5) ***Clearance from Airport Authority of India.***
6) ***(Indian Electricity Act 2003, The National Electricity Policy) including the environmental regulations (Environmental Protection Act 1987).***

The above listed approvals are available for verification by the DOE

Outcome of Step 1b:

Proposed project activity is not the only alternative amongst the ones considered by the project participants that is in compliance with all regulations with which there is general compliance. The alternatives listed for the cases of power, heat and biomass are in compliance with all mandatory applicable legal and regulatory requirements. Hence, identified realistic and credible alternative scenarios to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region and country ,and CDM-EB decisions on national and/or sectoral policies and regulations.

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Step 1 is satisfactorily passed. Proceed to step 2 (Investment analysis) or step 3. (Barrier analysis)

The additionality of the project activity has been established by conducting the Step 3: Barrier Analysis

Step 3: Barrier Analysis
Requirement: …., ***unless barrier analysis below is undertaken and indicates that the proposed project activity faces barriers that do not prevent the baseline scenario(s) from occurring, the project activity is considered not additional.***
If this step is used, determine whether the proposed project activity faces barriers that:
(c) Prevent the implementation of this type of proposed project activity; and
(d) Do not prevent the implementation of at least one of the alternatives.
…
If the CDM does not alleviate the identified barriers that prevent the proposed project activity from occurring, then the project activity is not additional.

In order to satisfy the above said requirements of step 3: barrier analysis, the following sub-steps(3a and 3b) in line with the "Tool for the demonstration and assessment of additionality (version 04), EB 36" have been followed

Sub-step 3a Identify barriers that would prevent the implementation of type of the proposed project activity:

Technological barriers:

⇒ The cogeneration plant at SDKSSN is a highly modernized cogeneration plant comprises of a high pressure boiler of capacity 125 TPH and a Double Extraction cum Condensing turbine of capacity of 20 MW. The power generation is about 20 MW during season and during off season from a single generation facility plant.

⇒ The power generation and its control and management is carried out by a remote Control System (DCS).

⇒ The power generation uses cane trash, apart from bagasse as fuel, thereby maximizes power production through the waste to energy. Usage of cane trash avoids the purchase of bagasse from outside and contributes to corresponding reductions in GHG emissions by transportation. Also the bagasse could be used in cogeneration facilities or boilers using fossil fuels

⇒ The above described technology of the cogeneration plant comprising of a boiler of 125TPH, equipped with a DCS for remote management of generation and export of the power is unique in the region. Also the cogeneration activity that maximizes power generation and export thereby resulting in reductions in GHG emissions which uses also cane trash during off season is also rare in the region

⇒ Risk of technological failure:

The whole biomass residues based cogeneration system is very sensitive and even small fluctuations in the grid may cause huge variations in the plant.

The project makes use of cane trash, the agricultural waste from sugarcane fields in the neighboring region, as a fuel during the off-season, and thereby maximizes the power generation and export by waste to energy process. Technical problems related to the usage of cane trash as a fuel for the project plant are as below

a. Cane trash has a lesser density and thus occupies more space for storage
b. Cane trash is vulnerable to fire accidents due to less moisture percentage*
c. When cane trash is mixed with the bagasse it causes jamming of the feeders leading to operational troubles and also discontinuous power generation
d. Energy and man power required to manage and collect cane trash from the field is more
e. Procurement Rates are higher as compared to bagasse
f. In the initial stabilization period there is a production loss due to the cane trash usage as a fuel

*(*As evidence, in the last year 70 tons of cane trash got burnt accidentally. Such type of incidents makes the usage of cane trash very risky.)*

g. the power generation system which is implemented and is operating on the basis of highest availability of bagasse taking the risks (and hindrances) of availability of bagasse and power purchase by the grid which is very unusual in the region and sector.

⇒ Skilled and experience personnel is required to ensure the continuous operation of high energy efficient and power generation configuration, and for the operation of DCS. The factory management is taking several energy conservation measures ***(As mentioned in the section A.4.3)*** to minimize the energy losses and to maximize the export of clean power to the grid. Availability of technically skilled and experienced engineers to operate and manage the power generation capacity ensuring continuous operation with no breakdown is rare.

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Barriers due to prevailing practice, *inter alia*:

- The project activity is the “first of its kind” in the region by of installing a 125 TPH boiler, equipped with a DCS for remote management of generation and distribution of the power generation and its export. Further, unlike the prevalent practice of using bagasse as fuel for cogeneration activity in sugar industries(whichever having cogeneration plants) in the region, the project activity maximizes power generation and export as well as reductions in GHG emissions by using cane trash from the neighborhood fields in addition to bagasse .

Outcome of Step 3a:
The proposed project activity faces the above mentioned identified barriers that prevent the implementation of this type of project activity.

CDM would alleviate the identified barriers that prevented the project activity to occur.. The Management seriously considered the project activity as CDM, and implemented the project activity inspite of the barriers. ***A copy of management board meeting decisions about the investment in the CDM project inspite of all the technical barriers and the operational risks is available for verification by the DOE.***

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

It has been identified in Sub-step 3a that the - project activity has faced barriers to occur. The other alternatives amongst the credible alternatives, listed at Table 2, except the one alternative given below, are prevented from occurrence. The one alternative amongst the credible alternatives that would not be prevented from the implementation is the following:
:

> **The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-)fired in the project activity. Similarly the generation of power in the grid would not be prevented from implementation by the identified barriers.**

Outcome of Sub-step 3 b: .The identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity)

Outcome of Step 3: *Determined that the proposed project activity faces barriers that prevent the implementation of this type of project activity; and do not prevent the implementation of at least one of the alternatives. The CDM would alleviate the identified barriers that prevent the proposed project activity from occurring. , and hence the project activity is additional.*

Conclusion

Both Sub-steps 3a – 3b are satisfied, and proceed to Step 4

Step 4: Common Practice analysis
Requirement

Sub-step 4a. Analyze other activities similar to the proposed project activity:

1. Provide an analysis of any other activities implemented previously or currently underway that is similar to the proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities are not to be included in this analysis. Provide quantitative information where relevant.

The project activity is characterized by a modernized cogeneration plant comprising of 125 TPH boiler, and equipped with a DCS for remote management and distribution of the power generation and export and resulting into maximization of waste to energy generation and also reductions in GHG emissions by way of usage of Cane trash from neighborhood fields efficiently and in large quantities during off season., The projects with the similar configuration (as of the current project activity) and not in the process of availing CDM Benefits or have already received CDM benefits are not in the region. Installation of cogeneration unit to meet the plant's energy requirements with no surplus power generation is the most common practice adopted by the sugar manufacturing units.

Sub-step 4b. Discuss any similar options that are occurring

2. If similar activities are widely observed and commonly carried out, it calls into question the claim that the proposed project activity is financially unattractive (as contended in Step 2) or faces barriers (as contended in Step 3). Therefore, if similar activities are identified above, then it is necessary to demonstrate why the existence of these activities does not contradict the claim that the proposed project activity is financially unattractive or subject to barriers. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially attractive (e.g., subsidies or other financial flows) or did not face the barriers to which the proposed project activity is subject.
3 Essential distinctions may include a serious change in circumstances under which the proposed CDM project activity will be implemented when compared to circumstances under which similar projects where carried out. For example, new barriers may have arisen, or promotional policies may have ended, leading to a situation in which the proposed CDM project activity would not be implemented without the incentive provided by the CDM. The change must be fundamental and verifiable.

Project Characteristics

Karnataka state has 48 sugar industries, producing sugar and generating bagasse as waste stream.

The practice in the sector and the region is:

1. based on assured quantum of own bagasse, establish boilers that meet the process steam requirements and also establish turbines to meet internal power requirements

2. based on assured quantum of bagasse, establish boilers that meet the steam requirements and also establish turbines to meet internal power requirements and supply small quantum of excess power to the grid.

Amongst the mentioned number of sugar industries, 18 sugar mills do have operating cogeneration plants supplying electricity to the grid. The respective bagasse based cogen activity of all these sugar mills are in the process of CDM registration.

Step 5: Impact of CDM Registration

The approval and registration of the SDKSSKN'S Biomass residues based Cogeneration project activity would have many positive impacts on the project activity:

- The project activity faces technological barriers (As mentioned in the section B.5 above) which make the investment and implementation of the current project activity at risk. CDM alleviates these barriers that prevented the project activity to occur, and the expected CDM revenue would increase the cash inflows for the project activity and would make the project become viable and attain successful operation.
- Keeping in view the financial crisis of the power sector and the tariff policy of KPTCL (which has been of a varying nature) , CDM revenue from the project activity would decrease the uncertainty involved and would aid the project to operate
- Registration of SDKSSKN'S Bagasse based Cogeneration project activity will encourage and trigger other sugar industries (particularly Cooperative Sugar factories) to look into their processes and feasibilities for power capacity expansion through better utilization of available bagasse and other biomass residues like cane trash. In their cases too, CDM would alleviate the barriers preventing the occurrences of power capacity expansion project activities. There are old cooperative sugar industries in the region that do not have their own power generation or only equipped with cogeneration systems of lower electrical efficiency generating part of the power required for on site needs of the sugar industry.

<u>Requirement:</u>

If the starting date of the project activity is before the date of validation, provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official, legal and/or other corporate) documentation that was available at, or prior to, the start of the project activity.

<u>Project Characteristics</u>:

The real action (investment decision) on the project activity has started in the year February 2002. The project activity started operation and export of the power to the grid in April 2004 and is in operation at present. Validation has not begun before the starting date of the project activity. The validation has begun in October 2007.

Prior to investment decision, Management of SDKSSKN had discussed about potential CDM revenue from the proposed cogeneration activity. Also a management resolution stating the decision for considering seriously CDM revenue from the project activity was passed as resolution in the Board Meeting held on 4th December, 2001(resolution no 20)

File with a copy of the resolution and related correspondences is available for verification by the DOE

The documentation as above provides evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. This evidence is based on official and legal communication.

Evidences: Copy of the Management Resolution of the 8th Board Meeting held on 4-12-2001.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>> Scenario 11 amongst the twenty scenarios given in the Table 1 of ACM0006/ver06 is applicable to the project activity. The scenario 11 is:

The project activity involves the installation of a new biomass residue fired power plant, which is operated next to (an) existing biomass residue fired power plant(s). The existing power plant(s) are only fired with biomass residues. After the implementation of the project activity, the existing power plant(s) either (a) continue to operate next to the new power plant (e.g. as back-up plant) or (b) could continue to be operated (i.e. the plant(s) are fully operational and have a remaining technical lifetime) but are retired due to the installation of the new biomass residue fired power plant. The efficiency of electricity generation is higher in the new power plant than in the existing plant(s). The biomass residues would in the absence of the project activity is used in the existing power plant(s) at the project site. Consequently, the power generated by the new power plant would in the absence of the project activity be generated (a) in the existing plant(s) and – since power generation is more efficient in the project plant than in the existing plant(s) – (b) partly in power plants in the grid. In case where the project plant is a cogeneration plant, the following conditions apply: The existing power plant(s) are also cogeneration plants; the heat generated by the project plant would in the absence of the project activity be generated in the existing cogeneration plant(s); the efficiency of heat generation in the project plant is smaller or the same compared to the existing cogeneration plant(s).

. **Emission Reductions**

According to the methodology ACM0006 ver06, the emission reduction $\mathbf{ER_y}$ by the project activity during a given year $\boldsymbol{y}$ is -:

$$\mathbf{ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - Ly}\text{----------------------------}\mathbf{(1)}$$

Where

$\mathbf{ER_y}$ - is the emissions reduction of the project activity during the year y in tons of CO_2,

$\mathbf{ER_{electricity,y}}$ - is the emission reduction due to displacement of electricity during the year y in tons of CO_2,

$\mathbf{ER_{heat,y}}$ - is the emission reduction due to displacement of heat during the year y in tons of CO_2,

$BE_{biomass,y}$ - is the baseline emissions due to natural decay or burning of anthropogenic sources of biomass during the year y in tons of CO_2 equivalents,

PE_y - is the project emissions during the year y in tons of CO_2, and

Ly - is the leakage emissions during the year y in tons of CO_2

Lifetime aspects

In case of scenario 11, a power plant was already operated at the project site prior to the implementation of the project activity. In this case, the existing plant could be retired at the start of the project activity because it is replaced by the project plant (this could be applicable

Similarly, in case of scenario 11, heat already have been generated at the project site prior to the implementation of the project activity. The existing heat generation facility (e.g. boilers or a cogeneration plant) is retired at the start of the project activity because it is replaced by the project plan

Consistent with guidance by EB08 and EB22, in these cases, a baseline based on historical performance only applies until the existing power plant or heat generation facility have been replaced

Project participants determined the age and the average technical lifetime of any existing power plant and/or heat generation facilities in a conservative manner. Emission reductions would be accounted until the existing power plant(s) or heat generation facilities would have reached its technical lifetime,

Project emissions

Project emissions include:

⇒ CO_2 emissions from transportation of biomass to the project site (PET_y)

⇒ CO_2 emissions from on-site consumption of fossil fuels due to the project activity ($PEFF_y$),

⇒ CO_2 emissions from consumption of electricity ($PE_{EC,y}$),

$$\mathbf{PEy = PETy + PEFF_y + PE_{EC,y} + GWP_{CH4} * (PE_{Biomass,CH4,y}} + PE_{WW,CH4,y}) \text{ ---------- } \mathbf{(2)}$$

Where,

PETy is the CO_2 emissions during the year *y* due to transport of the biomass to the Project plant in tonnes of CO_2,

$PEFF_y$ are the CO_2 emissions during the year y due to fossil fuels consumption in the project plant in tonnes of CO_2,

$PE_{EC,y}$ is the CO_2 emissions during the year y due to electricity consumption at the project site for activities that are attributable to the project activity (tCO_2/yr)

GWP_{CH4} is the Global Warming Potential for methane valid for the relevant commitment period,

$PE_{Biomass,CH4,y}$ is the CH4 emissions from the combustion of biomass during the year *y*.

$PE_{WW,CH4,y}$ CH_4 emissions from waste water generated from the treatment of biomass residues in year *y* (tCH_4/yr)

In determining emission coefficients, emission factors or net calorific values in this methodology, guidance by the 2006 IPCC have been followed.

a) Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass to the project plant (*PETy*)

Emissions resulting from transportation of biomass are calculated on the basis of -

Option 1 : Distance and number of trips of the vehicle (or the average truck load)

OR

Option 2 : The actual quantity of fossil fuels consumed for transportation.

Option 2 has been followed in this case.

$$PETy = \Sigma FC_{TR,i,y} * NCV_i * EF_{CO2,FC,I} \quad \text{---------------------------------(5)}$$

Where:

PETy Project emission during the year y due to transport of biomass residues to the project plant (tCO_2/yr)

$FC_{TR,i,y}$ Fuel consumption of fuel type i in trucks for transportation of biomass residues during the year y (mass or volume unit per year)

NCVi Net calorific value of the fossil fuel type i (GJ/mass or volume unity)

$EF_{CO2,FF,i}$ The CO_2 emission factor for the fossil fuel type i (tCO_2/GJ)

The calculational steps with the values used for calculating project emission due to transport of biomass are given at B.6.3

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

As **per the methodology ACM0006,** CO_2 emissions from on-site combustion of fossil fuels (*$PEFF_y$*) are calculated using the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". **Project participants used Methodological tool "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" Ver01 (EB32)** .

As per the methodology ACM0006, for the scenario 11, project emissions should be determined for the following two combustion processes *j*:

• Fossil fuels combusted in the project plant during the year *y* (*FFproject plant,i,y*);

• Fossil fuels combusted at the project site for other purposes that are attributable to the project activity during year *y* (*FFproject site,i,y*).

i.e. <u>PEFFy =Projects emissions ;</u> ($FF_{project\ plant,i,y}$) + *y* ($FF_{project\ site,i,y}$).

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Project participants co fire fossil fuels to a limited extent in order to enhance the economic performance of the plant.11 Also, the proper and efficient operation of the biomass residue fired power plant may require using some fossil fuels, e.g. for start-ups. Total quantity of fossil fuels consumed in the project plant is to a limited extent .

In addition, any other fuel consumption at the project site that is attributable to the project activity should be taken into account (e.g. for mechanical preparation of the biomass residues). Project participants do not consume any other fuel at the project site that is attributable to the project activity

$$\mathbf{FF_{project\ site,i,y}} = 0.0$$

<u>Therefore, PEFFy =Projects emissions because of</u> ($FF_{project\ plant,i,y}$)

AS per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion Ver01(EB32) ", CO_2 emissions from combustion of respective fuels at the project plant are calculated.

According to the tool, CO2 emissions from fossil fuel combustion in process *j* are calculated based on the quantity of fuels combusted and the CO2 emission coefficient of those fuels, as follows:

$$\mathbf{PE_{FC,j,y} = FC_{i,j,y} * COEF_{i,y}}$$

Where:

PEFC,j,y are the CO2 emissions from fossil fuel combustion in process *j* during the year *y* (tCO2 / yr);

FCi,j,y is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit / yr);

COEFi,y is the CO2 emission coefficient of fuel type *i* in year *y* (tCO2 / mass or volume unit); *i* are the fuel types combusted in process *j* during the year *y*.

The tool permits to calculate *COEFi,y* following two procedures, depending on the available data on the fossil fuel type *i*, as follows:

Option A: The CO2 emission coefficient *COEFi,y* is calculated based on the chemical composition of the fossil fuel type *i*,
Option B: The CO2 emission coefficient *COEFi,y* is calculated based on net calorific value and CO2 emission factor of the fuel type *i*, as follows:

The CO2 emission coefficient *COEFi,y* is calculated as per **option B** given in the methodical tool ver 01(EB32)) based on net calorific value and CO2 emission factor of the fuel type *i*, as follows

$$\mathbf{COEF_{i,y} = NCV_{i,y} \times EFCO2,i,y}$$

Where:

COEFi,y is the CO2 emission coefficient of fuel type *i* in year *y* (tCO2 / mass or volume unit);
NCVi,y is the weighted average net calorific value of the fuel type *i* in year *y* (GJ/mass or volume unit);
EFCO2,i,y is the weighted average CO2 emission factor of fuel type *i* in year *y* (tCO2/GJ); *i* are the fuel types combusted in process *j* during the year *y*.

Hence, $\mathbf{PEFFy = \sum (FF_{project\ plant,i,y})^* \ NCVi^* \ EF_{CO2,FF},}$

The calculations based on the the above equations, stepwise, with values used for calculating project emission due to transport of biomass are given at B.6.3

CO_2 emissions from electricity consumption ($PE_{EC,y}$)

CO2 emissions from on-site electricity consumption (*PEEC,y*) should be calculated using the latest approved version of the "Tool to calculate project emissions from electricity consumption". The on-site electricity consumption attributable to the project activity (*ECPJ,y*) should include all electricity consumption that is consumed by the project activity (e.g. for mechanical treatment of the biomass), No electricity is used for activities attributable to the project activity. Hence the

Hence $PE_{EC,y}$ =0.0

And "Tool to calculate project emissions from electricity consumption".is also not used in the PDD

Methane emissions from combustion of biomass residues ($PE_{Biomass,CH4,y}$)

For simplification, methane emissions from uncontrolled combustion of biomass residues is not included

$$PE_{Biomass,CH4,y} = EF_{CH4,BF} \sum BF_{k,y} \, NCV_k$$

Where:

BFk,y = Quantity of biomass residue type *k* combusted in the project plant during the year *y* (tons of dry matter or liter)
NCVk = Net calorific value of the biomass residue type *k* (GJ/ton of dry matter or GJ/liter)
$EF_{CH4,BF}$ = CH4 emission factor for the combustion of biomass residues in the project plant (tCH4/GJ)

Leakage

According to the methodology ACM0006 ver06, the main potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion or other sources due to diversion of biomass residues from other uses to the project plant as a result of the project activity. Changes in carbon stocks in the LULUCF sector are expected to be insignificant since this methodology is limited to biomass *residues*, as defined in the applicability conditions above.

As per the methodology ACM0006 ver06, since the most likely baseline scenario is the use of biomass residues for energy generation for scenario 11, the diversion of biomass residues to project activity is already considered in calculation of baseline reductions the leakage effects need not be addressed. Hence,

$$Ly = 0$$

Emission reductions due to displacement of electricity ($ER_{electricity,y}$)

$$\mathbf{ER_{electricity,y} = EG_y \cdot EF_{electricity,y}} \quad \text{----------(2)}$$

Where:

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

$\mathbf{EG_y}$ - 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

$\mathbf{EF_{electricity,y}}$ - is the CO_2 emission factor for the electricity displaced due to the project activity during the year *y* in tons CO_2/MWh.

Step 1: Determination of $EF_{electricity,y}$

The determination of the emission factor for displacement of electricity *EFelectricity,y* depends on the type of project activity and the baseline scenario identified. As per the methodology ACM0006, $\mathbf{EF_{electricity,y}}$ should be determined as follows for the scenario 11 identified in Table 2

For scenario 11,

The project activity displaces electricity from other grid connected sources (P4) or from less efficient plants fired with the same type of biomass residues (P2). Apart from co-firing fossil fuels in the project plant where relevant, electricity is not generated with fossil fuels at the project site.

Emission factor for displacement of electricity should correspond to the grid emission factor ($EF_{electricity,y} = EF_{grid,y}$) and $EF_{grid,y}$ shall be determined as follows:

Determination of Baseline Electricity Emission Factor (EFy= EFGrid,y) for the project activity in case of scenario 11

According to the methodology ACM0006 ver 06

- If the power generation capacity of the biomass power plant is of more than 15 MW, $EF_{grid,y}$ 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/ver 6).

- If the power generation capacity of the biomass power plant is less or equal to 15 MW, project participants **may alternatively use** the average CO_2emission factor of the electricity system, as referred to in option (d) in step 1 of the baseline determination in ACM0002/ver6.

The power generation capacity of the project activity is *more than 15 MW i.e. (20 MW),* $EF_{grid,y}$ is determined as a combined margin (CM). The project participant uses the CO2 baseline database, version 03 published in December 2007 of Central Electricity Authority (CEA), Ministry of Power, and GOVT. OF INDIA.

The latest CO2 baseline database is accessible at the website:

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

The CEA's CO2 baseline database uses the calculational approach of the baseline methodology according to ACM0002 Version 07, and Tool to Calculate the Emission Factor for an Electricity System (Version 01, EB 35 Annex 12), and is explained in the "CO2 baseline database for the Indian Power Sector", User guide, version 03, December 2007; and is accessible at the above mentioned website. The CEA CO2 baseline database ver03 provides with the operating margins **Operating Margin(EF_{OM}), Build Margin factor (EF_{BM}), and Combined Margin(CM)** calculated for the southern grid, which is the Grid System applicable for the project activity. The project proponent uses the values for the year 2006-07

As the power generation capacity of the project activity is <u>*more than 15 MW i.e. (20 MW),*</u> $EF_{grid,y}$ is determined as a combined margin (CM). The combined margin is a weighted average of the simple operating margin and the build margin. By default, both margins have equal weights (50%).

The project proponents will use the *actual* baseline grid emission factor *ex post.* The actual emission reductions will then be calculated in each year of the crediting period based on the observed net generation and the **Electricity Emission Factor (EFy= EFGrid,y)** for the respective year. The latter would be calculated and published annually by CEA, as mentioned in the CEA's CO2 baseline database version 03 user guide, December 2007.

The Annex 3 gives the data on OM, BM and CM as given in the CEA's CO2 baseline database Ver03, which are used in the project activity calculations. At annex 5 the values **obtained for emission reductions -** $\mathbf{ER_{electricity,y}}$ *based on* the **Electricity Emission Factor (EFy= EFGrid,y) are** *shown.*

<u>Determination of EG y</u>

For scenario 11, *EGy* is determined as the difference between

- the lower value between (a) the net quantity of electricity generated in the new power unit that is installed as part of the project activity and (b) the difference between the total net electricity generation by the new power unit and the existing power unit(s) and the historical generation of the existing power unit(s), based on the three most recent years, and
- the quantity of electricity that could be generated by other power plant(s) using the same quantity of biomass residues that are fired in the project plant,

$$EG_y = MIN\left\{\begin{array}{c} EG_{project\ plant,y} - \varepsilon_{el,other\ plant(s)} \cdot \dfrac{1}{3.6} \cdot \sum_k BF_{k,y} \cdot NCV_k \\ EG_{total,y} - \dfrac{EG_{historic,3yr}}{3} \end{array}\right\} \qquad \text{-------------} (3)$$

Where:

EG_y = Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year *y* (MWh)

$EG_{project\ plant,y}$ = Net quantity of electricity generated in the project plant during the year *y* (MWh)

$\varepsilon el_{other\ plant(s)}$ = Average net energy efficiency of electricity generation in (the) other power plant(s) that would use the biomass residues fired in the project plant in the absence of the project activity ($MWh_{el}/MWh_{biomass}$)

$EG_{total,y}$ = Net quantity of electricity generated in all power units at the project site, generated from firing the same type(s) of biomass residues as in the project plant, including the new power unit installed as part of the project activity and any previously existing units, during the year *y* (MWh/yr)

$EG_{historic,3yr}$ = Net quantity of electricity generated during the most recent three years in all power plants at the project site, generated from firing the same type(s) of biomass residues as in the project plant (MWh)

$BF_{k,y}$ = Quantity of biomass residue type *k* combusted in the project plant during the year *y* (tons of dry matter or liter)

NCV_k = Net calorific value of the biomass residue type *k* (GJ/ton of dry matter or GJ/liter)

For scenario 11 applies, *εel,other plant(s)* corresponds to the average net efficiency of electricity generation in the existing power plant(s) fired with the same type of biomass residue at the project site (*εel,existing plant(s)*).

ERheat,y (Emission reductions due to displacement of heat)

In case of scenario 11, heat and electricity would in absence of project activity be generated in a similar cogeneration plant but with a different configuration i.e. the efficiency of the 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 in the baseline scenario (existing plant in case of scenario 11).

Where, **εth,project plant < εth,reference plant**

This implies that the project implementation involves additional heat generation from other sources or a longer operation of project plant. This may result in an increase in GHG emissions.

To address this substitution effect for scenario 11, project proponent may either demonstrate that the thermal efficiency in the project plant is larger compared with the thermal efficiency of the plant considered in the baseline scenario and then assume ERheat,y=*0*

$$ER_{heat,y}=0$$

This increased level of heat generation as a result of the project activity may be generated by means of co-firing fossil fuels in the project plant. In this case, the emission reductions due to displacement of heat can be estimated as well as zero as a simplified assumption ($ER_{heat,y} = 0$).

BEbiomass,y (Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass)

Since the selected scenario is 11, baseline emissions due to natural decay and uncontrolled burning of anthropogenic sources of biomass residues are zero since in this case the biomass residues would not decay or be burnt in the absence of the project activity.
Thus for the given project activity

$$BE_{biomass,y} = 0$$

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

(Copy this table for each data and parameter)

Data / Parameter:	**CM**
Data unit:	tCO2/MWh
Description:	Combined Margin is the Electricity Emission Factor for southern electricity grid This parameter is for the calculation of CO_2 baseline emission factor for the electricity displaced due to the project activity (*EFelectricity,y*) (Southern Grid)
Source of data used:	CO2 Baseline Database for the Indian Power Sector User Guide;Ver 03 (www.cea.nic.in);Section5
Value applied:	1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is prepared by Central Electricity Authority, GOI.
Any comment:	Value for the year 2006-07

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	KgCO2e/GJ
Description:	Carbon dioxide emission factor of fossil fuel used for: 1. in the vehicle(diesel oil used as fuel in the trucks) used for transportation of biomass residues

	2. as fuel in the project site
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	74100
Justification of the choice of data or description of measurement methods and procedures actually applied :	The fuel used in the trucks used for transportation of biomass residues is diesel.
Any comment:	--

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	KgCO2e/GJ
Description:	Carbon dioxide emission factor of the fossil fuel used for co-firing (coal) in the project plant
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	94600
Justification of the choice of data or description of measurement methods and procedures actually applied :	Certain amount of fossil fuel (coal) is used as co-firing fuel in the project plant -boiler.
Any comment:	--

Data / Parameter:	**TLy**
Data unit:	tons
Description:	Average truck load of the trucks used for transportation of biomass residues

Source of data used:	This value is fixed by Government
Value applied:	9
Justification of the choice of data or description of measurement methods and procedures actually applied :	Trucks used for transportation of biomass to the project site are heavy duty trucks and their carrying capacity is fixed.
Any comment:	--

Data / Parameter:	**$FC_{TR,i,y}$**
Data unit:	Litres/km
Description:	Fuel consumption per km of the trucks for transportation of biomass residues per km (Litres/km)would be used in order to calculate the quantity of fuel consumed per year. Fuel consumption per year of fuel type i in trucks for transportation of biomass residues would be used in the equation of PET_y
Source of data used:	Petroleum Conservation Research Association
Value applied:	4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value has been taken from the site of PCRA. http://www.pcra.org/English/transport/saveDiesel.htm
Any comment:	--

Data / Parameter:	**NCVi**
Data unit:	TJ/Gg
Description:	Net calorific value of diesel
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories

Value applied:	43.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The diesel fuel is used in trucks for transportation of purchased biomass residues Diesel is also used as fuel at the project site for activities attributable to the project activity.
Any comment:	--

Data / Parameter:	**NCVi**
Data unit:	TJ/Gg
Description:	Net calorific value of Coal used for Co firing
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	25.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	The fuel used in co-firing is coal
Any comment:	--

Data / Parameter:	**EGhistoric,3yr**
Data unit:	MWh/yr
Description:	Net quantity of electricity generated during the most recent three years in all power plants at the project site, generated from firing the same type(s) of biomass residues as in the project plant16 (MWh); Fo rth epresent project activity, it is historic 3 year average net generation of 'existing power plant'
Source of data to be used:	Plant Records
Description of measurement	Prior to the start of the project activity (historically), the electricity generated were being measured by the energy meters situated on site

methods and procedures to be applied:	along with the consumption by the power plant auxiliaries. The historical net generation is determined by subtracting the auxiliary consumption from the total power generation of the plant. These data had been collected daily and archived at the plant.
Any comment:	

Data / Parameter:	$\varepsilon_{el,existing\ plant(s)}$ / $\varepsilon_{th,existing\ plant(s)}$
Data unit:	MWhel/MWhBiomass
Description:	Average net efficiency of electricity / heat generation in the existing power / cogeneration plant(s) fired with the same type of biomass residue at the project site
Source of data used:	calculated
Value applied:	.043
Justification of the choice of data or description of measurement methods and procedures actually applied :	Measure the quantity of fuels fired and the electricity generation during a representative time period and divide the quantity of electricity generated by the energy quantity of the fuels fired. (The existing plants have been replaced because of the project activity, though life time of these plants has not ended). The three most recent historical years should preferably be used to determine the average efficiency, where such data is available and where this time period is reasonably representative.
Any comment:	--

B.6.3 Ex-ante calculation of emission reductions:

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

$ER_{heat,y} = 0$
$BE_{biomass,y} = 0$
$Ly = 0$

Therefore, $ER_y = ER_{electricity,y} - PE_y$ **(a)**

$ER_{electricity,y} = EG * EF_{electricity,y}$ **(b)**

$EF_{electricity,y} = 0.85$

$EG = 62672$ **(MWh)/year**

$ER_{electricity,y} = 62672 * 0.85$

$= 53271$ tCO_2e/year ©

$PEy = PETy + PEFF_y + PE_{EC,y} + GWP_{CH4} * (PE_{Biomass,CH4,y} + PE_{WW,CH4,y})$ ----------

$PE_{EC,y} = 0.0$

$PE_{Biomass,CH4,y} = 0.0$

$PE_{WW,CH4,y} = 0.0$

Therefore,

$PEy = PETy + PEFF_y$

PETy (CO_2 emissions during the year *y* due to transport of the biomass to the Project plant in tonnes of CO_2,)

=

$PEFF_y$ (CO_2 emissions during the year y due to fossil fuel consumption in the project plant (co-fired by the generation facility) in tonnes of CO_2,

PETy

Total Distance = (Total Biomass residues brought from outside/Truck Capacity) * Return Trip Distance

= 80002.77/9 * 75
= 666690 Km

Fuel consumed = **Total Distance/Distance Travelled in 1 Ltr of Diesel**

= 666690/4
= 166672 litres /yr
= 173617 Kg/yr

PETy = {173617 *(43 *10-6) * 74100 }
= 553.20 **tonnes of** CO_2**/yr**

<u>**PEFFy**</u>

PEFFy = $FF_{project\ plant,i,y}) + y\ (FF_{project\ site,i,y})$.

(CO2 emissions from fossil fuel combustion in process *j* during the year *y* (tCO2 / yr) ,

$PE_{FC,j,y} = FC_{i,j,y} * COEF_{i,y}$

$COEF_{i,y} = NCV_{i,y} \times EFCO2,i,y$)

$PEFFy = \sum (FF_{project\ plant,i,y} + FF_{project\ site,i,y})* NCVi* EF_{CO2,FF}$,

$\mathbf{PE_{FFy}}$ = {0*1000* (25.8*10-6) *94600} + {(27698/0.96)*(43.0*10-6)* 74100}
= 92 tCO_2 / yr
28

Hence,

$\mathbf{PE_y = PET_y + PE_{FFy}}$

=565 + 4881

=5447 tCO_2e/year

ERy = ERelectricity,y - PEy

= 53271 – 5447

= 47824 tCO_2e/year

At Annex 5, the estimated values for project emissions, leakages and the .resultant estimated emission reductions calculated based on the above equations of the methodology ACM0006 ver06, are given.

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

>>

Year	**Total baseline Emissions (tonnes CO2e /yr.)**	**Project activity emission (tonnes CO2e /yr.)**	**Leakage (tonnes CO2e / yr.)**	**Emission reduction (tonnes CO2e /yr.)**
1st Year	53271	645.13	0	47824
2nd Year	53271	645.13	0	47824
3rd Year	53271	5447	0	47824
4th Year	53271	5447	0	47824
5th Year	53271	5447	0	47824
6th Year	53271	5447	0	47824
7th Year	53271	5447	0	47824

8th Year	53271	5447	0	47824
9th Year	53271	5447	0	47824
10th Year	53271	5447	0	47824
Total CO2e				478240

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

The approved consolidated monitoring methodology ACM0006/ver 06: "**Consolidated methodology electricity generation from biomass residues"** " is used.

The monitoring approach involves, where possible, the direct measurements of the variables required to monitor baseline and project emissions. The responsibilities for monitoring are assigned, and QA/QC procedures are applied by the project particiopants in the ptoject acytity. Where the methodology provides different options (e.g. use of default values or on-site measurements), which option will be used is specified. All meters and instruments are calibrated regularly as per industry practices. All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period.

The monitoring methodology involves monitoring of the following:

- Purchased biomass residues used for the project activity, and its availability aspects)
- Biomass residues combusted in the project activity
- Baseline emissions from grid electricity generation
- Coal consumed in co firing,
- Fossil fuel consumed for transportation, and at the project site for activities attributable to the project activity
- Imported Grid Electricity,if any, consumed at the project site for activities attributable to the project activity
- Power generated by the project plant

.Monitoring methodology and plan for all the relevant data and parameters includes measurement procedure,, usage of appropriate acd correct units, usage of calibrated and tested measurement equipments, adherence to QA/QC procedures, fixation of role and responsibilities for monitoring and involvement of these individuals during monitoring. Further, fixation of monitoring frequency and archiving of the monitored data are carried out. 100% of the data are monitored.

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**$BF_{k,y}$**

Data unit:	Tons of dry matter
Description:	Quantity of biomass residue type k combusted in the project plant during the year y
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	197000
Description of measurement methods and procedures to be applied:	Use of weight meters. The quantity should be cross checked with the quantity of electricity (and heat) generated and any fuel purchase receipts.
Monitoring Frequency	Continuously Annually an energy balance.
QA/QC procedures to be applied:	Cross check the measurements with an annual energy balance that is based on the purchased quantities and stock changes.
Any comment:	The biomass includes residues used in the project activity include own bagasse, purchased bagasse and cane trash from the neighbouring fields

Data / Parameter:	**$BF_{T,k,y}$**
Data unit:	Tons of dry matter
Description:	Quantity of biomass residue type k transported from outside to the project site during the year *y* where *k* are the types of biomass residues used in the project plant in year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	81832.00
Monitoring frequency:	Continuously, prepare annually an energy balance.
Description of measurement methods and procedures to be	Use of weight meters. The quantity should be cross checked with the quantity of electricity (and heat) generated any fuel purchase receipts.

applied:	
QA/QC procedures to be applied:	Cross check the measurements with an annual energy balance that is based on the purchased quantities and stock changes.
Any comment:	

Data / Parameter:	**Moisture content of the biomass residues**
Data unit:	% Water content
Description:	Moisture content of each biomass residue type *k*
Source of data to be used:	On-site measurements (Project activity uses dry biomass. Monitoring is carried out to confirm "usage of dry biomass residues")
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Monitoring frequency:	Continuously, mean values calculated at least annually
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Monitoring to confirm "usage of dry biomass residues"
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary.

Data / Parameter:	**AVDy**
Data unit:	km
Description:	Average round trip distance between biomass fuel supply sites and project site
Source of data to be used:	Records by project participants on the origin of biomass
Value of data applied for the purpose of calculating expected emission reductions in section B.5	75
Description of measurement methods and	Calculated from biomass available in, in and around area.

procedures to be applied:	
Monitoring Frequency	Continuously
QA/QC procedures to be applied:	Check consistency of distance records provided by the truckers by comparing recorded distances with other information from other sources (eg. Maps)
Any comment:	--

Data / Parameter:	**$FC_{TR,i,y}$**
Data unit:	litres
Description:	Fuel consumption of fuel type *i* in trucks for transportation of biomass residues during the year *y*
Source of data to be used:	Fuel consumption data provided by the transporters. Transporters determine from Fuel consumption meters of the vehicle.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	170484
Description of measurement methods and procedures to be applied:	-
Monitoring Frequency	Continuously, aggregated annually
QA/QC procedures to be applied:	Cross-checked the resulting CO_2 emissions for plausibility with a simple calculation based on the distance approach (option 1).
Any comment:	Applicable as option 2 is chosen to estimate CO_2 emissions from transportation.

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	KgCO2e/GJ
Description:	CO_2 emission factor for fossil fuel type *i*
Source of data to be used:	use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner
Value of data applied for the purpose of calculating expected emission reductions	94600

in section B.5	
Description of measurement methods and procedures to be applied:	-
Monitoring Frequency	Review of the appropriateness of the data annually.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$EF_{CO2,FF,i}$
Data unit:	KgCO2e/GJ
Description:	CO_2 emission factor for fossil fuel type *i*
Source of data to be used:	use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	74100
Description of measurement methods and procedures to be applied:	-
Monitoring Frequency	Review of the appropriateness of the data annually.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$FF_{project\ plant,i,y}$
Data unit:	tonnes
Description:	Quantity of fossil fuel type *i(coal for co-firing)* combusted in the project plant during the year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of	2000

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	-Use weight metres
Monitoring Frequency	Continuously
QA/QC procedures to be applied:	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes. Meters used for the measurement are calibrated with a regular frequency and calibration certificates would be obtained. The measurements are recorded in the original registers and also archived electronically.
Any comment:	This includes fossil fuels co-fired in the project plant but not any other fuel consumption at the project site that is attributable to the project activity

Data / Parameter:	$\mathbf{FF_{project\ site,i,y}}$
Data unit:	litres
Description:	Quantity of fossil fuel type *i* combusted at the project site for other purposes that are attributable to the project activity during the year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0
Description of measurement methods and procedures to be applied:	Use weight or volume meters..
Monitoring Frequency	Continuously
QA/QC procedures to be applied:	-Monitoring of "absence of usage of fossil fuel for any activities attributable to the project activity" is carried out annually
Any comment:	Project activity does not use energy (fossil fuel) for any purposes attributable to the project activity. However, absence of usage is

	monitored

Data / Parameter:	**NCVk**
Data unit:	GJ/ton of dry matter
Description:	Net calorific value of biomass residue type k
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	7.6
Description of measurement methods and procedures to be applied:	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measurement of NCV is based on dry biomass.
Monitoring frequency	At least every six months, taking at least three samples for each measurement.
QA/QC procedures to be applied:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (eg values in the literature, values used in the national GHG inventory) and default values by the IPCC.
Any comment:	--

Data / Parameter:	$\mathbf{EG_{project\ plant,y}}$
Data unit:	MWh
Description:	Net quantity of electricity generated in the project plant during the year y
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	62672
Description of measurement methods and	Monitored through meters, and from the electricity bill by the distribution company The consistency of metered net electricity generation should be cross-checked

procedures to be applied:	with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years).
Monitoring frequency	Continuously
QA/QC procedures to be applied:	The consistency of metered net electricity generation should be cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years).
Any comment:	--

B.7.2 Description of the monitoring plan:

>> This section describes the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, if any, generated by the project activity. The responsibilities and institutional arrangements for data collection and archiving is also indicated

For monitoring the project activity, Monitoring Methodology and Procedures as given in the approved consolidated monitoring methodology ACM0006 (Version 06): “Consolidated monitoring methodology for grid-connected electricity generation from biomass residues” are used.

Project participants do have established internal systems within the plant to monitor all the parameters and data which are listed at B 7.1. CDM standard operational procedures comprising of standard data measurement procedures , quality procedures, responsibilities for measurements and its verification, back up and archiving policy, data missing policy, training policy are strictly followed for the monitoring all the data parameters. The documents of manuals giving these procedures are available for verification by the DOE.

The Responsibilities for CDM as well as for monitoring the data and parameters are well defined with in the plant. The monitoring and measurements of all the data and parameters are carried out with the involvement and the supervision of the said responsible personnel of the plant. This organizational structure chart depicting the responsibilities for CDM and of the project activity which include various divisions in the plant are available in the form of a manual and are available for verification by the DOE.

QA/QC procedures to be followed while monitoring the mentioned parameters are given in the respective tables at B.7.1

All meters and instruments are calibrated regularly as per industry practices. Calibration certificates are available for verification by the DOE. Location chart of the electricity reading meters, flow meters, and other measuring instruments is available for verification by DOE.

All data collected as part of monitoring are archived electronically and shall be archived and be kept at least for 2 years after the end of the last crediting period.

. It may be noted that the monitoring data and parameters include, viz. the amount of own bagasse, purchased biomass combusted in the project activity is determined from the quantities of own generated biomass residues (own bagasse) and the amount of biomass delivered to the project site(purchased). On-site fossil fuel consumption for the operation of the biomass power plant should be metered through mass or volume (flow) meters,

A procedure of carrying out an energy balance for the verification period is established considering the stocks of biomass at the beginning and end of each verification period, and is available for verification by the validator.

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)

>>>>15/12/2008
Dr(Mrs)Suju George, CRAE SUSTAINABILITY, is responsible for applying the monitoring methodology to the project activity, and her contact information is sujugeorge@caresustainability.com. She is not a project participant

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:

>>01/04/2004

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

>> 25 years 0 months

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

C.2.1. Renewable crediting period

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

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>1/5/2008

or
The starting date of the crediting period shall be the date of Registration with UNFCCC which ever is later

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:

>> The project activity does not have any significant impacts.

There are no transboundary impacts

However, diligent documentation and examination of such impacts have been carried out by SDKSSKN and will be made available to the DOE. The mentioned rapid environmental impact assessment (REIA) study carried out for the biomass based cogeneration plant identified impacts, and found to be insignificant. A short brief relating to the project emissions/discharges from the REIA are given below:

The environmental impact assessment report of the SDKSSKN identified the below mentioned impacts of the project activity.

- **Liquid wastes**

Blow down of boiler and water from demineralization tank is collected in a neutralization tank. This water is then treated and fed for irrigation of the green belt in factory premises

- **Solid Wastes:**

The ash coming from boilers is mixed with the press mud and being treated with the spent wash generated by the distillery. This is treated and then converted to organic compost.

- **Atmospheric emissions**

The SPM level is less than 150 micron, which is, totally within the limits prescribed by the KSPCB this is achieved through installation of wet scrubbers at the plant.

All those impacts were mentioned and resolved during the environmental impact assessment procedure.

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:

>> No significant environmental impacts were identified by the project, according to national regulations. The consent for operation of the plant was granted by the KSPCB.

The host party does not consider the environmental impacts of such activities as significant and hence excluded such activities from the Environmental Impact Assessment Notification -2006 (http://envfor.nic.in/divisions/iass/notif/notif.htm) under Environment Protection Act -1986 amended in 1991)

State Pollution Control Board, KSPCB, has prescribed standards of environmental compliance, and monitors the adherence to the standards by the industry. At present SDKSSKN possesses the consent to operate as per Air and Water acts which is valid and obtained from KSPCB. The latest consent to operate has been issued on 12-12-2007

The project activity does not have any significant impacts. However, diligent monitoring of such impacts and implementation of Environment Management Plans are carried out regularly by SDKSSKN and will be made available to the DOEs (Validator and Verifier).

The periodic environmental (annual) audits are carried out and would take care of any undesirable environmental impacts.

SECTION E. Stakeholders' comments

>>

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

>> Stakeholder meeting was organized on 25/01/2007 by the project proponent at the project site to get the comments and suggestions of the local stakeholders on their project activity.

Announcement of the stake holder meeting was published in local language in a daily news paper ,Vijaya Karnataka on 11-1-2007, two weeks before the date of the meeting. The notice published in the newspaper was intended for bringing to the notice of the public about the stakeholder meeting, and was invitation for participation by stake holders and others who wish to attend and express their concerns and issues about the project activity. Further to this, notices were also stuck at public places for the public to read the announcement of the meeting and participate.
The mentioned news paper is available in the Stake holder Consultation file at the project site for verification by the DOE.

Representatives of a wide cross section of the society (Local Government and administrative officials (Panchayat officials), teachers from neighbouring academic institutions, community members, farmers, suppliers of raw material and equipments, senior citizens from neighbourhood, women from neighbourhood and local communities etc) were present in the stakeholder consultation meeting to express their views about the project activity. Representatives of the project proponent have been present to clarify their queries and receive their feedback about the project activity. The venue of the meeting was the 'HRD Hall" which is adjacent to the Cogeneration plant and is located within the SDKSSKN factory premises.

An attendance sheet of the participants with their signatures were prepared during the meeting. Original Signatures are available in the Stake holder Consultation file at project site, which is available for verification by the DOE

To get an organized and structured feedback from the stakeholders, the meeting was designed in a question answer format, where social, economic and environmental issues were raised in the form of questions, and comments were invited on them. Project proponent replied to their queries appropriately and suggestions came up in this meeting have been given due consideration and future actions were planned accordingly. A summary of the questions/comments/concerns from the different stakeholders was prepared during the meeting itself. Minutes of the meeting with signed by the chairman of the meeting annexed with the signatures of the participants and the summary of the questions/comments/concerns was also prepared. Minutes of the meeting and the summary of questions/comments/concerns from the stakeholders having names of the people who raised the queries (and also the signatures of all the participants) are available in the Stake holder Consultation file at the project site for verification by the DOE.

E.2. Summary of the comments received:

>> The following stakeholders were present in the stake holder meeting.

- Representatives administering the local area (village *Panchayat*)
- Employees of Doodhganga SSKN
- Village Representatives
- Farmers, suppliers of raw material and equipments
- Consultants and Advisors
- Local people: Teachers from neighbouring academic institutions, community members, , senior citizens from neighbourhood, women Local People

More than fifty participants were present in the meeting.

The participants expressed their comments, issues regarding the cogeneration activity of SDKSSKN. The issues, comments mainly focussed on points such as of changes in livelihood, economic opportunities, benefits to farmers, environmental impacts. The minutes of the consultation meeting along the notice of invitation and signatures of the participants are available examination by the DOE.

. The participants expressed that the following points during the stakeholder meeting: Project activity contributed to the increase in the income of many villagers in the neighbourhood. The project activity has resulted in job generation. The neighbourhood population has been directly involved with the project. They have been a part of the construction and operation of a power plant. The project did not require displacement of any local population. The local and neighbourhood farmers have found a local supply for their farming activities of sugar cane. The expression of gratitude and pleasure in the increased economic opportunities by the participants was made through comments many a times, and also the point that the project has not been causing any adverse social impacts on local population rather helped in improvising their quality of life.

The consultation also brought out the points that the construction and operation of the project has not resulted in shortage of the natural resources such as ground water, and also not causing environmental issues such as noise, air pollution during the operation of the projects as wells destruction of roads, farming activities due to transportation of sugar canes to the factory. The project activity has been welcomed by all stakeholders because it is environmentally benign

The stakeholders expressed that in future also the composition and involvement of the local population in the project activity should continue, and should further increase. The environment should continue to remain without negative impacts. The farmers should get the best pricing for their sugar cane. The progress of the sugar industry should get reflected proportionately

The rural population is directly involved with the project. They have been involved during construction and operation of a power plant in their vicinity. The project depends on the supply of biomass (sugarcane and cane trash) from the rural farmers The local populace is benefited from the subsidized rate of the fertilizers provided by the company .The residents of the village thanked the factory management for the improvement of the economic status of the region through the increased employment opportunities through the sugar factory's distillery, cogeneration unit and the industry as a whole.

The project did not involve displacement of any local population. Thus, the project does not cause any adverse social impacts on local population rather helps in improvising their quality of life.

Summary of the questions and comments received, and the responses by the project proponent is available for verification by the DOE.

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

>> The representatives of the project proponent were present in the consultation meeting to clarify their queries and to respond to the concerns expressed by the stake holders.
The participants expressed their comments, issues regarding the cogeneration activity of SDKSSKN. The issues, comments mainly focussed on points such as of changes in livelihood, economic opportunities, benefits to farmers, environmental impacts
SDKSSKN clarified all the stakeholders' concerns by providing relevant evidence of the project claims and answered all question to the satisfaction of the participants. The project proponents also assured that their feedback on the project activity; those require project proponents' due account, would be taken up for actions.

SDKSSKN also informed the stakeholders that the project activity would contribute to the sustainable development of the region and country by facilitating and catalyzing local and regional opportunities, thereby creating sustainable shareholder, economic, social and environmental value.

Details of the project such as environmental and other clearances, equipment details, DPR, Environmental monitoring data and Impact Assessment were some of the documents present at the meeting site.

The questions/concerns from the stakeholders and SDKSSKN's responses have been recorded. Queries and responses, and the minutes of the consultation meeting along with the names and signatures of the persons who raised the queries and all the participants are available in Stake holder Consultation file at the project site for verification by the DOE).

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shree Doodhganga Krishna Sahakari Sakkare Karkhane Niyamit
Street/P.O.Box:	Chikkodi
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URL:	
Represented by:	
Title:	Chairman & Managing Director
Salutation:	Mr.
Last Name:	Patil
Middle Name:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project has not received any public funding

Annex 3
BASELINE INFORMATION

In this project, emission factor for displacement of electricity corresponds to the grid emission factor (EFelectricity,y = EFgrid,y) and EFgrid,y is combined margin (CM) according to ACM0002 Version 07.

The project participant uses the CO2 baseline database, version 03 of Central Electricity Authority (CEA), Ministry Of Power, and GOVT. OF INDIA.

The latest CO2 baseline database is accessible at the website:

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

The CEA's database uses the approach of the baseline methodology ACM0002/ver 07 for determining the **emission factors for all the regional grids in India.** Equations, Calculational Approach, Assumptions, Data and Calculations of CO2 emissions adopted by CEA in determining CO2 emission factors are explained in the "CO2 baseline database for the Indian Power Sector", **User guide, version 03,** December 2007; and is accessible at the above mentioned website.

Table 4: Weighted average emission factor, simple operating margin (OM),build margin (BM) and combined margin (CM) of all Indian regional grids for FY 2006-07 (excludes imports), in tCO2/MWh

	Average	**OM**	**BM**	**CM**
North	0.72	0.99	0.63	0.81
East	1.03	1.13	0.93	1.03
South	**0.72**	**1.00**	**0.71**	**0.85**
West	0.85	0.99	0.59	0.79
North-East	0.39	0.69	0.23	0.46
India	0.80	1.01	0.68	0.85

Table 5: Weighted average emission factor, simple operating margin (OM),build margin (BM) and combined margin (CM) of all Indian regional grids for FY 2006-07 (includes imports), in tCO2/MWh

	Average	**OM**	**BM (not adjusted for imports)**	**CM**
North	0.74	1.00	0.63	0.81
East	1.00	1.09	0.93	1.01

South	**0.72**	**1.00**	**0.71**	**0.85**
West	0.86	0.99	0.59	0.79
North-East	0.40	0.70	0.23	0.46
India	0.80	1.01	0.68	0.84

- Average is the average emissions of all stations in the grid
- OM is the average emission from all the stations excluding the low cost/must run sources.
- BM is the average emission of the 20% (by net generation) most recent capacity addition in the grid.
- CM is a weighted average of the OM and BM.

Annex 4
MONITORING PLAN

Given at Section B.7.1

Annex 5

ESTIMATED VALUES OF PROJECT EMISSIONS, LEAKAGES AND EMISSION REDUCTIONS FOR THE PROJECT ACTIVITY

ERelectricity, y - emission reductions due to displacement of electricity

$$ER_{electricity,\ y} = EG_{y} * EF_{electricity,y}$$

Year	EF elec	EG y	ER elec,y
Year1	0.85	62672.0	**53271**
Year2	0.85	62672.0	**53271**
Year3	0.85	62672.0	**53271**
Year4	0.85	62672.0	**53271**
Year5	0.85	62672.0	**53271**
Year6	0.85	62672.0	**53271**
Year7	0.85	62672.0	**53271**
Year8	0.85	62672.0	**53271**
Year9	0.85	62672.0	**53271**
Year10	0.85	62672.0	**53271**

Estimation of Emission Reductions

$$ERy = ERheat,y + ERelectricity,y + BEbiomass,y - PEy – Ly$$

ERheat,y =0.0

BEbiomass,y=0.0

Year	Estimated Baseline Emissions	Project Emissions	Leakages	Emission Reductions
	tCO2e	tCO2e		tCO2e
Year1	53271	5447.21	0	47824
Year2	53271	5447.21	0	47824
Year3	53271	5447.21	0	47824
Year4	53271	5447.21	0	47824
Year5	53271	5447.21	0	47824
Year6	53271	5447.21	0	47824
Year7	53271	5447.21	0	47824
Year8	53271	5447.21	0	47824
Year9	53271	5447.21	0	47824
Year10	53271	5447.21	0	47824
Total emission reductions for the crediting period				478240