



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

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

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**KMS Power 6 MW Renewable Sources Biomass Power Project.****Version 02****26/03/2006****A.2. Description of the small-scale project activity:**

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Purpose

The purpose of the project essentially is to utilize the available biomass fuels<sup>1</sup> in the region effectively for generation of clean power. The generated power will be sold to the power deficit state grid for sustainable economic growth, conservation of environment through use of freely and abundantly available biomass fuels and Green House Gas (GHG) emission reduction. The project will also help certain extent to bridge the gap between the ever-increasing demand and supply of electricity in the state of Andhra Pradesh (AP).

The fuels used are rice husk, cotton stalk and paddy straw. The fuel requirement for 100% capacity is 22,200 t/yr of rice husk, 18,200 t/yr of cotton stalk, 19,600 t/yr of paddy straw and some quantity for Juliflora. KMS power uses each of the fuels for a period of 3 months in a year. A detailed survey for fuel availability and location has been carried by competent agency and the fuels are made available from the Guntur district in the state of Andhra Pradesh. Guntur district is one of the prominent agriculturally and industrially developed districts of Andhra Pradesh.

Considering the adequate availability of bio-mass in the area, KMS have set up the power plant in Vandavelli village, Sattenapalli Mandal, Guntur district, Andhra Pradesh.

The following local benefits are also envisaged due to the setting up of project:

- Proper utilization of abundantly available biomass;
- Generation of eco-friendly green power;
- Avoidance of burning of agriculture waste;
- Reduction of CO<sub>2</sub> emissions

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<sup>1</sup> Sustainably grown renewable cyclic crops.



### Contribution to Sustainable Development

The project activity is a renewable energy power project for power generation and export of clean power to Transmission Corporation of Andhra Pradesh (APTRANSCO). This generation of power will substitute the power generated and fed to conventional fossil fuels dominated grid.

Indian economy is highly dependent on “Coal” as fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met. This results in excessive demands for electricity and place immense stress on the environment. Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the effective utilization of Renewable Energy (RE) sources.

Since this project activity utilizes renewable energy source, it will positively contribute towards the reduction in (demand) use of finite natural resource like coal/gas/oil, minimizing depletion or else increasing its availability to other important processes.

Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines<sup>2</sup> for CDM projects.

1. Social well being
2. Economic well being
3. Environmental well being
4. Technological well being

Project activity contributes to the sustainable development in following way:

#### 1. Social well being:

- Since, the project is proposed in a rural area, the project would lead to the development of the region.
- Since, the biomass resources are to be collected and transported to the plant site from the fields, opportunities are being generated for the rural people to collect and transport biomass. This will result in the enhanced employment of the rural people.

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<sup>2</sup> Ministry of Environment and Forest web site:[http://envfor.nic.in/cdm/host\\_approval\\_criteria.htm#](http://envfor.nic.in/cdm/host_approval_criteria.htm#)



- More and more rural industries are expected to be set up as a consequence to the power plant in the area. This also will cause infrastructure development in the area, which ultimately leads to the rural development. This also prevents the migration of the rural poor to cities large extent due to opportunities created by the power plant.
- In order to ensure sustained sources of raw material supply to the power plant, the company has embarked on encouraging energy plantation by the farmers in their wastelands.

### 2. Economical well being:

- The project activity generates employment in the local area. The project will also provide economic value to agricultural and wood wastes and provides stable and quality power to neighbouring industries, farmers and households. The project will create a business opportunity for local stakeholders such as bankers, consultants, suppliers, manufacturers, contractors *etc.*
- The main resources for power generation are biomass fuels such as rice husk, cotton stalk, Juliflora and paddy straw *etc.* Crop residues are collected from the farmers out of their field and brought to the project, thus generate additional revenue on account of supply of these crop residues to the project, which are otherwise being under-utilized / burnt so far with no commercial value. In other words, the plant is generating commercial value to crop residues enabling the farmers to get better price out of their produce augmenting their income. The above benefits due to project activity ensure that the project would contribute to the social and economic well being in the region.

### 3. Environmental well being

- Since, the project uses only biomass materials for power generation, which otherwise would have been a fossil fuel such as coal, lignite and gas, the project does not lead to GHG emissions. Combustion of biomass materials in the project result in GHG emissions of CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>x</sub>. The major constituent of GHG emissions is CO<sub>2</sub> which about 98%, whereas CH<sub>4</sub> and NO<sub>x</sub> constitute the remaining 2%. This can well be evidenced from the typical ultimate analysis<sup>3</sup> of biomass materials, which indicates the Nitrogen content is within 1 to 2%, therefore CH<sub>4</sub> emission is negligible. Hence the CO<sub>2</sub> is considered as the only GHG emissions from the biomass combustion.

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<sup>3</sup> Chemical analysis of elements in the fuel (biomass).



- Since the biomass is formed by fixing the atmospheric CO<sub>2</sub> by the action of photosynthesis in the presence of sunlight, the CO<sub>2</sub> released due to combustion of biomass is assumed to be equal to the CO<sub>2</sub> fixed by the photosynthesis. Again the CO<sub>2</sub> released during the combustion will be consumed by the plant species for their growth. In view of the above, biomass combustion and growth of biomass and associated CO<sub>2</sub> consumption and release can be treated as cyclic process resulting in no net increase of CO<sub>2</sub> in the atmosphere. Hence, the project activity will not lead to GHG emissions.

#### 4. Technological well being

The technology selected for the proposed project is a more energy efficient technology due to the following features. The project uses a steam turbo generator with matching boiler of Fluidized bed type capable of firing multiple fuels with highest possible system efficiency. In addition, the auxiliary power consumption for FBC type is comparable with other efficient combustion system types.

In view of the above the project participant considers that the project activity profoundly contributes to the sustainable development.

#### **A.3. Project participants:**

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Name of Party involved (*) (host indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	KMS Power Private Limited (Private entity.)	No

(\*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

*See contact information in Annex-1 to this PDD*

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

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The project activity is a 6 MW capacity grid-connected biomass based renewable energy power plant with high-pressure steam turbine configuration. On an annual average basis, the project is exporting around 5.2 MW power to the APTRANSCO grid after considering auxiliary power consumption of 11%. The plant will be operating at an annual average plant load factor of 80%.

As per MNES guidelines for the biomass based power plant projects, use of coal as a fuel is allowed



maximum up to 30% on annual basis and the same has been considered for the conservative estimation of project emissions though the percent allowed by APPCB is less than the same. Although KMS proposed to use coal as a fuel in case of shortage of biomass only, maximum use of coal (30%) has been considered for estimation of project emissions to arrive at conservative figure of GHG emission reductions. KMS uses Indian coal and imported coal in the plant, as per the availability. To arrive at the average CO<sub>2</sub> emission factor of coal, low calorific Indian and high calorific imported coal has been considered for calculations and actual figures of calorific values and carbon contents needs to be used during the verification.

Further, no transmission and distribution losses are considered while calculating GHG emission reductions, since the project exports power to the APTRANSCO grid, which is located at about 3.5 km from the site.

The power plant has one condensing steam turbo generator unit with a matching boiler of fluidised bed type capable of firing multi fuels with rice husk, cotton stack, juliflora and paddy straw as the main fuels. All necessary auxiliary facilities of the power plant are provided. The boiler is sized to produce a maximum of 28 tons per hour of steam. The steam turbine is a straight condensing type machine with two bleed off, one to deaerator and one to Low Pressure (LP) heater for feed water heating. The steam conditions at the boiler heat outlet are at a pressure of 66 kg/cm<sup>2</sup> and temperature of 480+ 5<sup>0</sup>C. The higher steam operating parameters result in higher annual savings of fuel when compared to lesser steam operating parameters such as 44 kg/cm<sup>2</sup> and temperature of 440<sup>0</sup>C.

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

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**A.4.1.1. Host Party(ies):**

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

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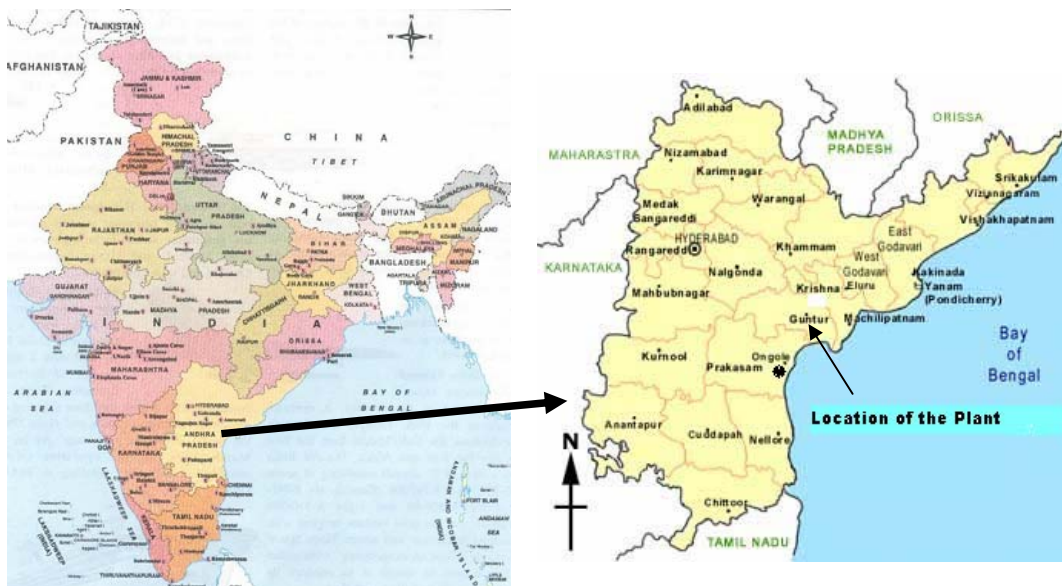
**Andhra Pradesh****A.4.1.3. City/Town/Community etc:**

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

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The plant is located in Vandavelli village, Sattenapalli Mandal, Guntur district, Andhra Pradesh. The plot area of the existing plant measures about 13 acres (52609.7 m<sup>2</sup>). The plant site is approachable by an all weather motorable road. There are connecting roads to the proposed site from Sattenapalli on eastern and western side of site. Source of water for the plant is from the Guntur Branch Canal suitably supplemented by bore wells in the plant site. Power generated from the plant is evacuated to APSEB grid through their 33 kV Sattenapalli sub station which is about 3.5 km from the site.



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

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As per Clause 2 of Type I.D of Appendix B of **simplified modalities and procedures for small-scale CDM project activities (Version 05: 25 February 2005)**, in case of unit which co-fires renewable biomass and fossil fuel the capacity of the entire unit shall not exceed the limit of 15 MW, for the project to qualify as a small-scale CDM project. Therefore, the proposed project activity can be defined under

**Main Category:** Type I - Renewable Energy Project (Small Scale)

**Sub Category:** “D”, Renewable Electricity Generation for a Grid (Biomass based Power Project)

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

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The power plant uses environmentally sustainable grown biomass and only in case of exigencies can use coal as fuel. The GHG emissions of the combustion process, mainly CO<sub>2</sub>, is consumed by plant species,



representing a cyclic process. Since, the biomass contains only negligible quantities of other elements like Nitrogen, Sulphur etc. release of other GHG are considered as negligible. The biomass is CO<sub>2</sub> neutral and thus environmentally benign limiting greenhouse effect.

Clean and green power equivalent of around 161.8 Million kWh for a period of 7 years (84 months) in AP would be supplied from the 6 MW non-conventional renewable sources biomass based power plant thereby resulting in CO<sub>2</sub> emission reduction of around 113,859 tons. In the absence of the proposed activity, the same energy load would have been taken-up by thermal power plants and emission of CO<sub>2</sub> would have occurred due to combustion of conventional fuels like coal / gas.

According to the draft 16<sup>th</sup> electrical power survey<sup>4</sup> conducted by the Central Electricity Authority (CEA), the projected growth in the total energy consumption is expected to be 7.5 % per annum for the period 1997-98 to 2004-05. The energy requirement - 392 billion kWh in 1997-98 - is assessed to be 632 billion kWh in 2004-05. This puts tremendous pressure on fast depleting natural resources to use more to meet the continuous increase in demand. Effective utilization of abundantly available renewable sources to minimize the usage of fossil fuels is the need of the hour. However, due to various technical and policy related barriers (as mention in section B3) the share of renewable energy in the APTRANSCO grid is less than 1%.

The power plant not only justifies the shortage of power availability and energy but also the eco-friendly power generation.

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

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Years	Annual estimation of emission reductions in tonnes of CO <sub>2</sub> e
2002-2003*	11960
2003-2004	16266
2004-2005	16266
2005-2006	16266
2006-2007	16266
2007-2008	16266
2008-2009	16266
2009-2010**	4306
<b>Total estimated reductions (tones of CO<sub>2</sub>e)</b>	<b>113,859</b>
<b>Total number of crediting years</b>	<b>7</b>
<b>Annual average over the crediting period of estimated</b>	<b>16266</b>

<sup>4</sup> CEA Publication



Years	Annual estimation of emission reductions in tonnes of CO <sub>2</sub> e
reductions (tonnes of CO <sub>2</sub> e)	

\* Only 8 months \*\* only four months

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

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No public funding from parties included in Annex I is available to the project. Project is implemented with equity of project proponent (KMS) and long term debt by Indian bank.

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

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According to Appendix C of Simplified Modalities & Procedures for small scale CDM project activities, 'Debundling' is defined as the fragmentation of a large project activity into smaller parts.

With reference to the criteria mentioned, this biomass power plant is not a de-bundled component of a large project activity as there is no registered small scale CDM project activity (previous 2 yrs) or an application to register another small scale CDM project activity by the same (KMS) project proponent, in the same project category and technology/measure with project boundary within 1 km radius of this project activity.

**SECTION B. Application of a baseline methodology:****B.1. Title and reference of the approved baseline methodology applied to the small-scale project activity:**

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**Title:**

Renewable electricity generation for a grid

**Reference:**

The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW is available in the “Appendix B of the simplified modalities and procedure for small scale CDM project activities. Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Renewable technologies that supply electricity to the grid are covered in category I.D. The category comprises renewable such as small hydro, wind, geothermal and biomass that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or nonrenewable biomass fired generation unit.

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

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**Main Category:           Type I - Renewable Energy Power project****Sub Category:            D Renewable Electricity Generation for a Grid**

As per the Kyoto Protocol (KP) baseline should be in accordance with the additionality criteria of article 12, paragraph 5(c), which states that the project activity must reduce emissions that are additional to any that, would occur in the absence of the certified project activity.

Document Annex B to attachment 3 regarding indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, provides guidelines for preparation of Project Design Document (PDD) including baseline calculations. The category and the sub type of the activity are given above.

Baseline methodology mentioned in the paragraph no. 7 of Type I. D. of Appendix B of the simplified modalities and procedures for small scale CDM project activities, states that the baseline is the kWh



produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO<sub>2</sub>/kWh) calculated in transparent and conservative manner as under:

- a) The average of the “approximate operating margin” and “build margin”, where;
  - i) The “Approximate operating margin” is the weighted average emissions (in kg CO<sub>2</sub> equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;
  - ii) The ‘Build margin’ is the weighted average emissions (in kg CO<sub>2</sub>equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent<sup>5</sup> 20%<sup>6</sup> of existing plants or the 5 most recent plants”;
- OR
- b) The weighted average emissions (in kgCO<sub>2</sub>equ/kWh) of current generation mix.

Considering the available guidelines and the present project scenario, southern regional grid has been chosen for baseline analysis by selecting “The Combined Margin emissions” (method (a)) for baseline calculations.

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

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The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

As per the decision 17/cp.7 Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

Further referring to Appendix A to Annex B document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants shall provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s) ;

### 1. Prevailing Practice barrier

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<sup>5</sup> Generation data available for the most recent year

<sup>6</sup> If 20% falls on part capacity of a plant, that plant is included in the calculation



There were only 4 biomass based power plants of capacity 21 MW installed/running before the construction start of KMS power plant which was only 5% of the total sanctioned capacity of 410.55 MW by NEDCAP. This is due to the fact that there is a financial risk involved in the implementation and operation of these projects. This proves the low penetration of the non-conventional energy based projects in AP. Hence, the project is not a common practice and determines the additional activity.

During the initial stages of the project activity, project participant had taken the below mentioned risks apart from the financial risk due to low penetration as mentioned above:

- a. Availability of Biomass at competitive prices: Though the availability of biomass in the region was estimated as abundant for the power generation throughout its life cycle, the availability of the same at competitive prices to operate the plant in sustained manner was not known with the likely scenario of setting up of more biomass based power plants in the region and state. Risk due to seasonal variations on availability of biomass fuels and its affect on the availability of biomass at reasonable rates was also high. Plant has taken risk due to these factors considering the availability of future revenue through carbon credits that could offset some of the difficulties.
- b. Technology risk: As the biomass based power generation was a relatively new concept and very few projects set up in the state, the long term effects of combustion of biomass fuels with different characteristics on the plants equipments was not yet established and the extent of risk due to the same was not known.

The above-mentioned facts suggest that the biomass based power generation was a riskier business with the barriers and uncertainties mentioned than other alternatives like fossil fuel based power generation.

## **2. Financial barrier**

The CDM fund for the project was initially considered to cover the project risk related to the fuel (biomass) price increase in the future. The CDM fund is critical considering biomass availability and prices are seasonal, which depends on many external factors whereas the earnings for the power plant are at long term fixed rate. Therefore, the revenue from CDM could prove to be vital, as they would significantly improve the sustainability of the project, as the project can be rendered financially unstable under the external conditions like



- a) The increase in cost of fuel and
- b) The decrease in tariff by virtue of revised tariff by the off taker

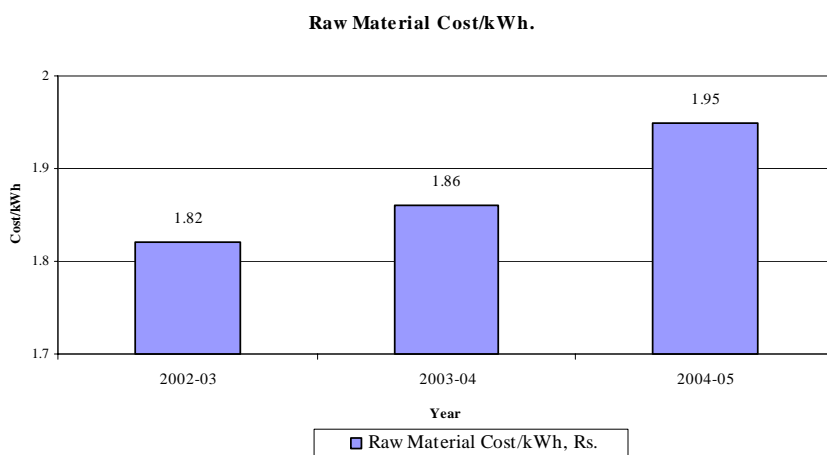
The above factors are true for the project activity and in absence CDM funds it is very likely that project activity would have used (or may use) more financially viable option such as coal as fuel.

Raw material cost since inception has increased from Rs. 600 to Rs. 1200. A brief comparison of the cost of raw material is given herewith.

	DPR COST (RS)	EXISTING COST (2004 – 05) (RS)
Rice husk	600	1200
Juliflora	600	1100

KMS Power has also initiated energy plantation in 1 acre of land near the plant site to ensure continuous supply of raw material to the plant.

Due to the increase in the raw material cost there has been a continuous increase in the cost per unit of generation since the project inception. The increase in the raw material cost, per unit of generation since the project inception to date is shown below. It is envisaged that the raw material cost in the subsequent years would continue to increase.



**Cost of Generation**

It has been observed that the cost per unit of generation for the past three years has steadily increased due to the increase in the raw material cost. The details of the unit generation cost are given hereunder:



Year	Cost per unit of generation (Rs./kWh)			
	Raw Material	O & M	Interest	Total
2002-03*	1.82	0.62	0.94	3.38 <sup>7</sup>
2003-04	1.86	0.63	0.66	3.15
2004-05	1.95	0.63	0.66	3.24

\*: The plant was in operation for a period of 8 months in this year

The initial PPA with the off taker APTRANSCO was signed at a tariff of Rs. 2.25 per unit with base year as 1995-96 and 5% escalation per year. The tariff for the year 2003-04 was Rs. 3.48 per unit. However, with the revised<sup>8</sup> tariff order by Andhra Pradesh Electricity Regulatory Commission (APERC), the tariff rate is Rs 2.88 per unit. This would result in heavy financial losses and put an additional burden on the financial sustainability of the project.

### *CDM Benefits per 7 years*

	CERs	Rate (Euros)	Exchange rate	INR	Million Units replaced	Cost per unit (Rs.)
<b>KMS</b>	113,859	5	55	31,311,175	161.8	0.19

The CDM benefit per unit (kWh) of power replaced is about Rs. 0.19. Hence, the total benefit for KMS including the tariff cost of Rs. 2.88 would amount to Rs. 3.07, which is less than the existing cost of generation i.e. Rs. 3.24 per unit.

It is envisaged that the raw material cost would further increase, which would lead to further increase in the cost of generation. KMS also faces poor financial returns due to the policy changes and poor returns from the off takers. The IRR for the project is estimated at 8.7% with out CDM benefits and is 17.6% with CDM benefits.

Thus the project justifies the need of CDM funds for the project activity, which will help in significantly improving the project competitiveness and financial sustainability due to reduction in tariffs and increase in raw material cost.

### **3. Funding at higher interest for the project:**

The project was financed by the Indian Renewable Energy Development Authority (IREDA) at net interest rate of 12.5%. Though, the project proponent has debt sanction from other banks at a lower rate, they are not able to avail the benefit due to the prepayment charge of Rs. 10.2 Million from IREDA for

<sup>7</sup> The cost of generation for the 1<sup>st</sup> year is high as the plant was in operation of a period of 8 months only due to which the interest per unit of generation is high.

<sup>8</sup> APERC tariff order, R.P. No.84 / 2003 in OP No 1075 / 2000 dated 20.03.2004



loan closure. Hence, the project proponents are operating the plant at a higher interest rate resulting in financial loss.

The CDM funds would enable the proponent to switch their debt from a high interest debt to a lower interest debt and ensure sustainability of the project.

#### 4. Policy related barriers

APERC in a landmark order has proposed to reduce the power tariff rates for non-conventional energy sources. The rate per unit has been decreased from Rs 3.48/- per unit to Rs 2.88/- per unit. As per the new proposal the tariff rates will be of two parts – fixed and variable. The fixed cost is based on the year of commissioning and it will come down gradually over a period of 10 years, whereas variable cost will go up by 5% every year up to a control period of 5 years.

However, it has been observed that the cost of the fuel from inception to date has increased thereby increasing the cost of generation. This has resulted in creating an imbalance in the % increase in variable cost and operating cost.

#### *The year wise (for credit period) effect of tariff changes with respect to fixed and variable price & cost*

Fixed cost tariff:		Variable cost	
Year of operation	fixed cost (Rs./unit)	Financial year	Variable cost (Rs./unit)
1st	1.61	2004-05	1.27
2nd	1.57	2005-06	1.33
3rd	1.53	2006-07	1.40
4th	1.49	2007-08	1.47
5th	1.45	2008-09	1.54
6th	1.41		
7th	1.37		
8th	1.33		
9th	1.26		
10th	0.87		

The biomass plant had been successfully operating at a PLF between 85-90%. However, as per the new policy initiative, plants operating with 80% PLF will be paid a fixed rate as per the PPA and the additional units generated at the additional PLF will be paid at a variable cost of Rs 1.27 with an incentive of Rs.0.25 amounting to a total of Rs. 1.52.



Though the plant has a design capacity to operate at a higher PLF it does not operate as it is not financially viable. The variable cost of operating the plant at a PLF greater than 80% is about Rs. 1.70 per unit generation. However, with the revised policy, the proponent would be paid only Rs.1.52 per unit of excess generation making it financially unviable. However, with the additional CDM benefit of Rs.0.19 per unit, if made available, the total benefit for the proponent would be Rs.1.71 (i.e. Rs. 1.52 + 0.19), which is comparable to the variable cost and would encourage the proponent to operate at PLF greater than 80% to generate more CERs and also reduce the production, operation & maintenance cost.

Thus it is imperative that, to generate power in excess of 80% PLF will significantly hamper the sustainability of the project with out CDM funds. The CDM funds can contribute towards viability of generation of the balance 20%, which will indirectly help in reduction of CO<sub>2</sub> emission, if not generated.

Thus it is imperative that the present tariff is not sufficient and will significantly impact the sustainability of the project. To generate renewable power, the CDM funds can contribute towards sustainability of the project, which will indirectly help in reduction of CO<sub>2</sub> emission, if not generated. Also, the power tariff will be under revision every 5 years instead of 10 years as per the new proposal from APERC.

The existing APTRANSCO generation mix comprises of:

- ✓ 57% thermal power plants;
- ✓ 42% hydro projects; and
- ✓ 1% wind and cogeneration projects

In thermal power plant category, coal based plants contribute for 46% and balance 11% is contributed by the gas based power plants. This illustrates that biomass plants are still considered as rather financially risky proposition and with changing scenario, the CDM revenue will contribute to their financial stability.

For example, earlier, there was 3rd party sale and the tariff was not supposed to be less than the high tension line (HT1) tariff of Rs.4.32. However with the advent of Regulatory Commission in 1999 there is no 3rd party sale. Earlier there was 2% wheeling charges on 3rd party sale and later it was changed to 28.4% and Rs. 0.50 per unit to neutralize the tariff of 3rd party and APTRANSCO. Hence, all the Biomass power plants have shifted their sale of power to APTRANSCO, wherein they have to abide by the APRANSCO policies..



This discussion suggests that there are clear policy related threats and barrier to the proposed project activity, which can be mitigated to certain<sup>9</sup> extent from CDM benefit.

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

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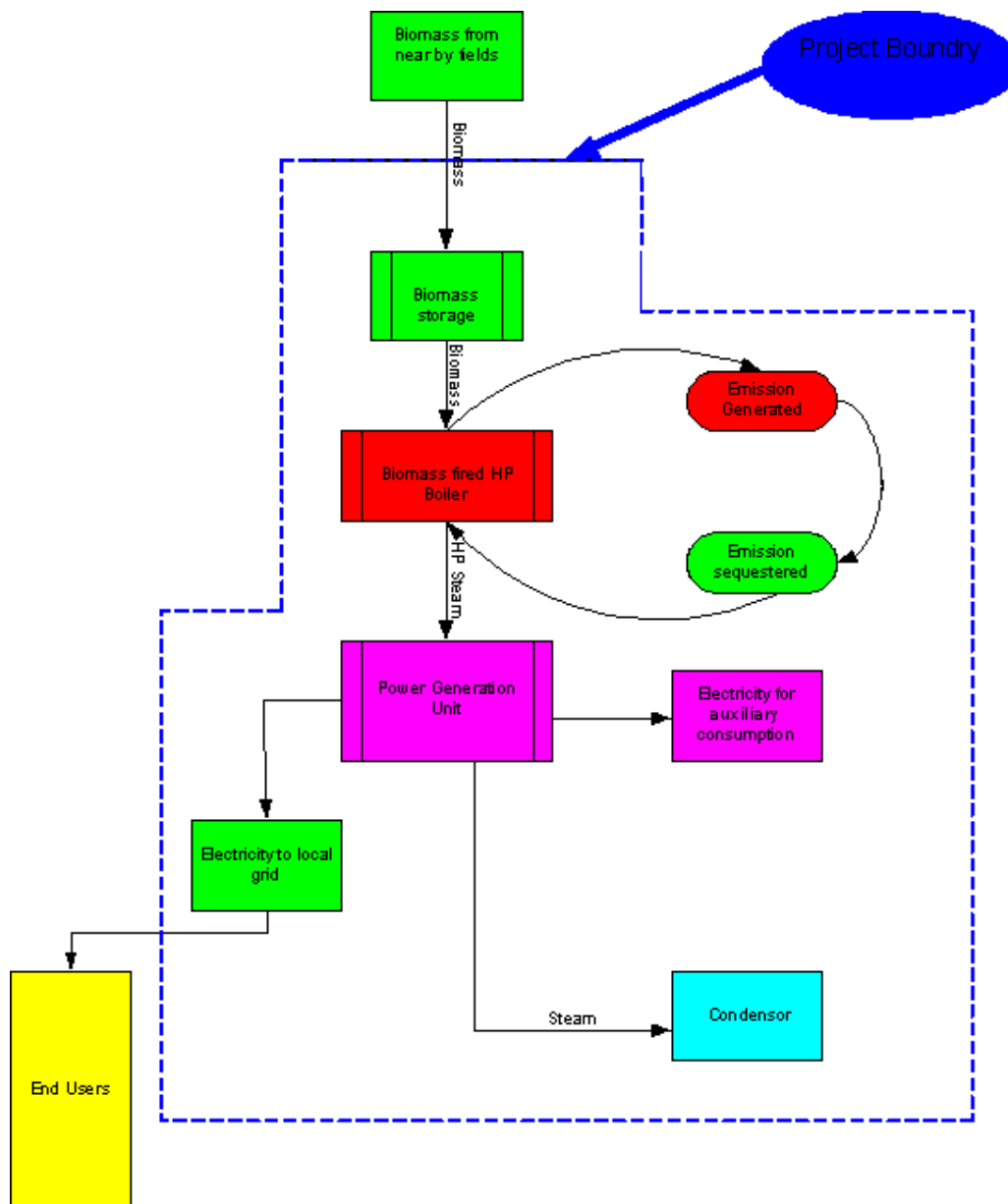
As per the guidelines mentioned in Type I. D. of Appendix B of the simplified modalities and procedures for small-scale CDM project activities, project boundary encompasses the physical and geographical site of the renewable generation source.

Hence, the project boundary covers the point of fuel supply to the point of power export to the grid where the project proponent has a full control. Hence, project boundary is considered within these terminal points. However, for the purpose of calculation of baseline emissions, regional grid is also included in the project boundary.

Thus, boundary covers fuel storage and processing, boiler, Steam Turbine Generator (STG) and all other power generating equipments, auxiliary consumption units and electricity grid.

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<sup>9</sup> Uncertainty related to carbon market and cash flows is also a deterrent.



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

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Since the project activity is feeding power to AP state electricity grid which is a part of southern regional grid, the baseline for this project activity is the function of the generation mix of southern regional grid. Using the methodology available for small-scale project activities as discussed in section B2 above, the combined margin emissions (in kgCO<sub>2</sub>equ/kWh) of current generation mix of southern grid is used for the calculation of baseline. Actual CO<sub>2</sub> emission factors are used for the purpose.



The baseline methodology has followed the one specified under Project category I.D in Appendix B of the Simplified M&P for small scale CDM project activities.

All existing sources of power generation have been considered from various authentic sources. Percentage share of power generation from different fuel sources has been calculated. The IPCC emission factors for different sources of power generation have been considered wherever necessary. The baseline estimation has considered an ex-ante weighted average emission factor and the same will be used for throughout the project crediting period to reduce the monitoring cost.

Also, during the baseline estimation authentic information such as an average national calorific value of coal, actual coal used in power plants etc is used. IPCC emission factors are used for fuels. These values will be different for particular power plant. However, these are authentic values and the degree of uncertainty is low.

**Date of completing the final draft of this baseline section (DD/MM/YYYY):**

15/12/2005

**Name of person/entity determining the baseline:**

KMS Power Private Company Limited (as mentioned in Annex-I), who is also a project participant.

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

&gt;&gt;

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

&gt;&gt;

Project started construction on 14<sup>th</sup> December 2000 (14/12/2000) which after 1 January 2000 and is operational since July 22nd 2002.

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

&gt;&gt;

Life time of the project: 25 years

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

&gt;&gt;

**C.2.1. Renewable crediting period:**

&gt;&gt;

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

&gt;&gt;

Starting date of first crediting period: 23/07/2002

**C.2.1.2. Length of the first crediting period:**

&gt;&gt;

7 years (7y)

**C.2.2. Fixed crediting period:**

&gt;&gt;

**C.2.2.1. Starting date:**

&gt;&gt;

**C.2.2.2. Length:**

&gt;&gt;

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

&gt;&gt;

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

&gt;&gt;

Monitoring methodologies / guidelines mentioned in the UNFCCC document of “Appendix B of the simplified modalities and procedures for small scale CDM project activities” for small scale projects (Type I:D) is considered as basis for monitoring methodology for the activity. The document states that the monitoring shall consist of metering the electricity generated by the renewable technology.

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

&gt;&gt;

The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of approved methodology for baseline calculations for CDM projects of capacity less than 15 MW is available in the “Appendix B of the simplified modalities and procedure for small scale CDM project activities”. As the power plant is of 12 MW capacity, reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

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

&gt;&gt;

ID number <i>(Please use numbers to ease cross-referencing to table D.6)</i>	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long is archived data to be kept?	Comment
D.3.1	Power	Electricity generated	KWh	Measured	Daily	100%	Electronic	2 years	From the control room energy meter
D.3.2	Power	Auxiliary consumption	KWh	Measured	Daily	100%	Electronic	2 years	Based on the difference between energy generated and energy exported
D.3.3	Power	Power export	kWh	Measured	Daily measurement and monthly recording	100%	Electronic	2 years	Based on the readings from tri-vector meter in APTRANSCO sub station
D.3.4	Fuel	Biomass used	MT	Measured	Daily	100%	Paper	2 years	
D.3.5	Fuel	Avg. calorific value of Biomass used	Kcal/Kg	Measured	Monthly	100%	Paper	2 years	Through sample testing in lab. Tested monthly only if the source of biomass is different.
D.3.6	Fuel	Coal	MT	Measured	Daily	100%	Paper	2 years	
D.3.7	Fuel	Carbon content in coal	%	Measured	For each batch of coal	Grab sample	Paper	2 years	Through sample testing in lab. Tested every batch only if the source of fuel is different.
D.3.8	Fuel	Calorific value of coal	Kcal/Kg	Measured	For each batch of coal	Grab sample	Paper	2 years	Through sample testing in lab. Tested every batch only if the



									source of fuel is different.
--	--	--	--	--	--	--	--	--	------------------------------

Note: All the data will be archived for two during crediting period after the issuance of CERS

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

>>

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
D.3.1 to 3.8	Low	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency

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

>>

Project proponent is implementing the following operational and management structure in order to monitor emission reductions and any leakage effects, generated by the project activity.

Project proponent form a CDM team/committee comprising of persons from relevant departments, which will be responsible for monitoring of all the parameters mentioned in this section. In the CDM team, a special group of operators will be formed who will be assigned responsibility of monitoring of different parameters and record keeping. On daily basis, the monitoring reports will be checked and discussed.

On monthly basis, these reports will be forwarded at the management level.

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

>>

KMS Power Private Limited, who is also a project participant

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

&gt;&gt;

**E.1.1 Selected formulae as provided in appendix B:**

&gt;&gt;

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

&gt;&gt;

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

&gt;&gt;

The project proponent uses biomass as fuel. However, the project proponent, in case of exigencies uses coal as fuel instead of biomass. The CO<sub>2</sub> emissions during the usage of coal has been calculated in the following manner:

**1. Using IPCC standard CO<sub>2</sub> emission factor**

$$CE_c = Q * CC * EFC$$

where,

CE<sub>c</sub> - Carbon-dioxide emission due to coal burning at project site, MT

CC - Calorific value of coal, kcal/ton

Q - Quantity of coal burned, MT

EFC - IPCC standard emission factor kg of CO<sub>2</sub>/kcal

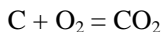
**OR**

**2. Using actual carbon content of the coal**

CO<sub>2</sub> Emission [in kgs]= Stoichiometric CO<sub>2</sub> from carbon content of coal [based on total carbon content ]

To have an estimate of the project CO<sub>2</sub> emission quantity due to combustion of coal along with the biomass, total carbon content of the coal should be known.

Combustion reaction for CO<sub>2</sub> emission is as under.



Assuming complete combustion of coal, following formula can be used for conservative estimation of CO<sub>2</sub> emissions.

$$CE_c = (44 / 12) * C * Q$$

where,



CEc - Stoichiometric carbon-dioxide emission due to coal burning at project, MT

C - Carbon percentage in coal, %

Q - Quantity of coal burned, MT

Though project emissions due to the usage of coal will be estimated based on the procedures mentioned above during monitoring and verification stage, for the conservative estimation purpose, 30% of total generation was considered using coal in the baseline calculation sheet.

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

>>

The leakage activity identified, which contributes for GHG emissions outside the project boundary is transportation of biomass from biomass collection centers to biomass power project site. Calculation of leakage has been carried-out as under:

▪	Biomass to be procured	-	77,800 MT
▪	Average Distance between project site and biomass collection centers	-	30 km
▪	Biomass load per truck	-	5 MT
▪	Number of return trips	-	15,560
▪	Consumption of Diesel per trip	-	15liters (4km/litre)
▪	Total Diesel consumption	-	233,400 liters per annum
▪	CO <sub>2</sub> emission factor for Diesel (as per IPCC guidelines)	-	74.10 tons CO <sub>2</sub> /TJ
▪	CO <sub>2</sub> emission per annum	-	696 tons

The CO<sub>2</sub> emission (leakage) occurs during the transportation of coal from the mines to respective coal based power plants. The distance between the coal mines and the power plants is higher as compared to the transportation distance between biomass collection centers to biomass power project site and hence the higher CO<sub>2</sub> emissions. To be on conservative side, this leakage due to coal transportation has not been added while calculating the baseline of southern regional grid and hence a small leakage due to transportation of biomass has been neglected from the calculations and estimations of emission reductions.

In addition to above, project emissions also occur due to transportation of the fly ash for disposal. Plant generates around 10000 tons of fly ash per annum. Number of trips to dispose fly ash to destination is around 3 per day. However, the distance of transport of fly ash from the plant to brick manufacturers in the area is well below 100 km and number of truck trips per annum are less than 1500, hence the emissions due to the same have also been neglected.

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

&gt;&gt;

Considering the negligible CO<sub>2</sub> emissions due to leakage due to fuel transportation, these emissions are considered to be zero. However, the emissions from the project using coal as supplementary fuel would be considered for the estimation of net GHG emissions.

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

&gt;&gt;

Southern Regional grid is considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. It is observed that, in the Southern regional grid generation mix, coal, diesel and gas based power projects are responsible for GHG emissions. The following approved methodology has been considered for baseline calculations.

**Method: The average of the approximate operating margin and the build margin (Combined margin)**

*Method: Combined Margin*

**(a) Baseline Power Generation**

$$P_{wlc} = P_{tot} - P_{lrc}$$

Where

$P_{wlc}$  Power generation by all sources, excluding hydro, biomass and nuclear

$P_{tot}$  Power generation by all sources of grid mix

$P_{lrc}$  Power generation by Hydel, nuclear, biomass projects

**(b) Sectorwise baseline power generation**

$$P_{fuel} = \frac{P_f}{P_{wlc}} \times 100$$

Where

$P_{fuel}$  Share (in %) of power generation by each fuel used (coal and gas in present scenario), out of total power generation excluding Plrc

$P_f$  Power generation by fuel used (in million kWh units)

**(c) Calculation of Operating Margin emission factor**



$$OM_{bef} = \sum P_{fuel} \times E_{fuel} \text{ for base year for Scenario 1}$$

Where

$OM_{bef}$  OM emission factor of baseline calculated for each year (kg/kWh)

$E_{fuel}$  Emission factor (actual or IPCC) for each fuel type considered (e.g coal, gas)

#### (d) Calculation of Build margin emission factor for each source of baseline generation mix

$BM_{yr}$  = Weighted average of emissions by recent 20% capacity additions or MWh of five most recent plants, which ever is higher

Where

$$BM_{yr} = \text{Build margin for base year (kg/kWh)} = \frac{\sum P'_f \times E'_f}{\sum P'_f}$$

Where

$P'_f$  Generation capacity from specific fuel in the most recent 20% power plant or five most recently built plants, whichever is higher

$E'_f$  Emission factor for the specific fuel in the most recent 20% power plants built or five most recently build plants

#### (e) Combined Margin Factor

CMF for each year crediting period

$$= (OM_{bef} + BM_{yr}) / 2 \text{ (in kg/kWh)}$$

Final (net) baseline emission factor (NEFB) = 0.830

(Refer to Baseline excel sheet)

#### (f) Power Generation and Export by project activity

$$TP_{gen} = TP_{exp} + TP_{loss}$$

Where

$TP_{gen}$  Total power generated

$TP_{exp}$  Total clean power export to grid per annum



$TP_{\text{loss}}$  T&D loss

**(g) Emission reduction by project activity**

$$ER = TP_{\text{exp}} \times (NEF_B - NEF_p) - EL$$

Where

ER Emission reduction per annum by project activity (tonnes/year)

$TP_{\text{exp}}$  Total clean power export to grid per annum

$NEF_B$  Final emission factor of baseline

$NEF_p$  Net emission factor of project activity (=0)

EL Emission leakage (tonnes/year) (= 0)

Step by step calculation using combined margin methodology of CO<sub>2</sub> emissions due to burning of coal, diesel and gas for power generation and emission reductions by the project activity is as under.

<b>Step 1</b>	:	Net operating emission factor for coal, lignite	=	Actual emission factor for coal/lignite x % of generation by coal/lignite out of total generation excl. RE projects
<b>Step 2</b>	:	Net operating emission factor for gas, diesel	=	Step 1 is to be repeated for gas and diesel
<b>Step 3</b>	:	Operating margin factor	=	Net emission factor for coal + Net emission factor for gas + Net emission factor for Diesel
<b>Step 4</b>	:	Built Margin factor	=	Weighted average of emission factors of most recent 20% plants or 5 most recently built plant, whichever is higher
<b>Step 5</b>	:	Average of operating and build margin factor	=	(operating margin factor + built margin factor)/2
<b>Step 6</b>	:	Units exported to APTRANSCO		Total Power generation – Total auxiliary consumption.
<b>Step 7</b>	:	CO <sub>2</sub> emission reduction	=	Units exported to AP grid x Average of operating and build margin factor

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

>>

Following formula is used to determine Emission reduction

$$\text{CO}_2 \text{ emission reduction due to project activity} = \text{Net CO}_2 \text{ baseline emissions} \times \text{Electricity exported to grid (in kWh)} - \text{Project emissions}$$



= 202610 - 88751  
 = 113859

<b>E.2 Table providing values obtained when applying formulae above:</b>
--

>>

	Operating Years	Net Baseline Emission Factor (kg CO <sub>2</sub> /kWh)	Baseline Emissions (tonnes of CO <sub>2</sub> )	Project Emissions (tonnes of CO <sub>2</sub> )	Emission Reductions (tonnes of CO <sub>2</sub> )
1.	2002-2003*	0.830	21283	9323	11960
2.	2003-2004	0.830	28944	12679	16266
3.	2004-2005	0.830	28944	12679	16266
4.	2005-2006	0.830	28944	12679	16266
5.	2006-2007	0.830	28944	12679	16266
6.	2007-2008	0.830	28944	12679	16266
7.	2008-2009	0.830	28944	12679	16266
8.	2009 – 2010**	0.830	7662	3356	4306
<b>Total CERs</b>			<b>202,610</b>	<b>88,751</b>	<b>113,859</b>

\* Only 8 months \*\* only four months

Therefore, an conventional energy equivalent of 161.8 Million kWh for a period of 7 years (84 months) would be replaced by exporting power from the 6 MW Biomass based power plant which in turn will reduce 113,859 tons of CO<sub>2</sub> emissions considering baseline calculations.

Baseline data used for the calculation is provided in Annex-3 and the detailed calculation using the formulae is presented in an Excel Sheet (refer Enclosure – I to this PDD).

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

&gt;&gt;

The project being a renewable energy biomass based power project it does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. As per the government of India notification dated June 13, 2002 based on environment protection rule, 1986, public hearing and EIA is required for those industries/projects which are listed in the predefined list of ministry of environment and forest. Thermal power projects with investment of less than Rs. 100 crores have been excluded from the list. Hence, it is not required by the host party.

However, detailed environmental management plan is in place in the project activity location. Brief description on the measures taken towards the environment protection in the plant is given below:

1. Stack height of 46 m is provided for effective dispersion of pollutants.
2. The effluent generated in the plant will be treated in the Effluent Treatment Plant (ETP). The effluent characteristics after the treatment are in complying with the standards stipulated by A.P Pollution Control Board.
3. The treated effluent is utilized for green belt development within the plant premises.
4. Electrostatic precipitator is provided to bring down the SPM emissions from boiler to 115 mg/nm<sup>3</sup>.
5. Acidic and alkaline effluent streams coming from cation and anion units of DM plant are neutralized in a neutralization tank.
6. The service water is passed through oil & grease trap to remove the oil content present in the effluent.
7. The boiler blow down due to its higher pH is neutralized before mixing with other effluent streams.
8. The sanitary waste water is treated in septic tank followed by soak pit.
9. Plantation of small and tall trees is done around the plant area for better environment.
10. The ash collected from the ESP is utilized for brick manufacturing.

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

&gt;&gt;

The local stakeholder comment invitation and compilation process involved is as follows:

The local stakeholders are immediately affected by the activities of the project. The effect is on the local environment, social life and economics. All the individuals and organizations falling in the above effects are perceived as stakeholders. They can be within the boundaries of the village, district, state or nation.

On deciding above criteria for qualification of the stakeholders, the idea was to decide most appropriate representatives who are covering above. During interaction of the corporate headquarter and the plant management, the stakeholders were identified as:

- Office bearers of the neighbouring villages local bodies
- Authorities of the District local administration
- Biomass suppliers
- Local NGOs
- Customer (APTRANSCO)
- Licensing and regulatory authorities like
  - NEDCAP
  - APPCB
  - MoEF (Govt. of India)
  - MNES (Govt. of India)

KMS has been constantly in touch with other identified stakeholders like licensing and regulatory authorities. Their views are reflected in the form of permissions granted for the project. In this aspect, the permission by NEDCAP, MoEF, APPCB and MNES are indication of favorable impression for the project.



### Stakeholders Involvement

The village Panchayat /local elected body of representatives administering the local area are a true representative of the local population in a democracy like India. Hence, their consent / permission to set up the project is necessary. KMS has already completed the necessary consultation and documented their approval for the project.

Local population comprises of the local people in and around the project area. The roles of the local people are as a beneficiary of the project. The local population will be involved in the supply of the biomass and hence the project would be a beneficial project for the local population. In addition to this, the project would also lead to local manpower working at the plant site. Since, the project will provide good direct and indirect employment opportunities the local populace is encouraging the project.

The project does not require displacement of any local population. In addition, the local population is also an indirect consumer of the power that is supplied from the power plants.

The distance between the electrical substation for power evacuation and the plant is less; installation of transmission lines will not create any inconvenience to the local population.

Andhra Pradesh Pollution Control Board (APPCB) has prescribed standards of environmental compliance and monitors the adherence to the standards. The project has already received No Objection Certificate (NOC) from APPCB to start the plant.

Non-conventional Energy Development Agency of AP (NEDCAP) implements policies in respect of non-conventional renewable power projects in the state of Andhra Pradesh and has accorded approval to the project.

As a buyer of the power, the APTRANSCO is a major stakeholder in the project. They hold the key to the commercial success of the project. APTRANSCO has already cleared the project and KMS has already signed Power Purchase Agreement (PPA) with APTRANSCO.

The government of India, through Ministry of Non-conventional Energy Sources (MNES), has been promoting energy conservation, demand side management and viable renewable energy projects including wind, small hydro and bagasse cogeneration / bio-mass power. The project meets their requirements.

**G.2. Summary of the comments received:**

&gt;&gt;

As mentioned above, KMS has already received the approvals and clearances for their project from the following stakeholders:

- Consent order of Establishment and operation from Andhra Pradesh Pollution Control Board;
- Power Purchase Agreement with APTRANSCO;
- Clearance from the Gram Panchayat, Vandavelli village

Although, in India, public participation at any stage of project implementation is not required, being a CDM activity, project proponent has invited the local stakeholders including Sarpanch (head) of village, representative of local population, representative of local NGO and biomass suppliers to express their views on the project and the summary is presented as below.

All the stake holders in the project like local farmers, biomass suppliers, representatives of the people expressed their happiness about the implementation of project in their village since the project activity has generated new employment opportunities for the villagers and also for creating an additional means of revenue for local farmers/biomass waste suppliers/local transporters which will positively help to improve living standard and the socio-economic condition of the village. Other benefit mentioned by them is additional revenue from the project activity in terms of tax, to gram panchayat, which will be utilized for the development of the village. They also expressed that the project activity has lead to development of rural entrepreneurship.

In summary, every stakeholder expressed that the project activity is helping the socio-economic development of the village and nearby area without affecting the local environment adversely.

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

&gt;&gt;

The relevant comments and important clauses mentioned in the project documents like Detailed Project Report (DPR), environmental clearances, power purchase agreement, local clearance etc. were considered while preparation of CDM project development document.

Further, the document will be published on UNFCCC/Validator's website for public comments.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

Organization:	KMS Power Private Limited
Street/P.O.Box:	247, 3 <sup>rd</sup> Floor, Dwarkapuri Colony, Punjagutta
Building:	
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500 082
Country:	India
Telephone:	91-40-23356699
FAX:	91-40-23351908
E-Mail:	
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Mohan
Middle Name:	
First Name:	Madan
Department:	
Mobile:	98481-36365
Direct FAX:	
Direct tel:	
Personal E-Mail:	



Annex 2

**INFORMATION REGARDING PUBLIC FUNDING**

No Public Funding is available to the project.



### Annex-3

#### BASE LINE DATA

The methodology adopted for the calculation of the baseline is ‘the combined margin emissions of the current generation mix’. Year 2004-05 is considered as the base year for prediction of future capacity additions during the crediting period. Southern Grid generation data as tabulated in Enclosure-II is used for consideration of installed southern grid capacity and energy availability during the period 2004-05.

In order to arrive at the detailed break up of power generation mix in Southern Region, various documents and various web sites were referred. The websites referred for estimating the generation mix in southern regional grid are:

1. <http://www.infraline.com>
2. <http://www.bisnetwork.net>
3. <http://www.apgenco.com>
4. <http://www.kptcl.com>
5. <http://cea.nic.in>
6. <http://www.tneb.org>
7. <http://www.ksebboard.com>

As per the availability, actual generation figures as against the sector wise installed capacity were used. Wherever the break up of generation was not available, proportionate calculated figures were used so as to match the total energy availability.



#### **Annex 4 Monitoring Plan**

All the parameters mentioned in the monitoring plan have been monitoring in the plant but in other formats. The entire process of monitoring has been streamlined and will be made available in the required format during the verification process and for subsequent useful purposes. The Fuel Consumption data, etc are being maintained in different formats. The data formats for CDM have already been finalized and started monitoring accordingly to ensure and demonstrate existence of MVP in the plant.

The calibration of monitoring equipment is being maintained as per the requirement of APTRANSCO and the same is being done regularly. Power Generation, Export & Auxiliary Consumption, fuel consumption are being recorded daily and the same is being verified and approved by General Manager of the plant. These records are being sent to Head Office for review by the Director and for corrective actions if necessary.

The Plant is equipped with energy meters/export meters for monitoring and control purpose. There are two energy meters at APTRANSCO sub station to measure the export power, namely main meter and check meter with 0.2 class accuracy. The energy meters shall be tested and calibrated utilizing a standard meter. The standard meter shall be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of AP as per terms and conditions of supply. The tests of meters shall be jointly conducted by authorised representatives of both the parties and the results and correction so arrived at mutually will be applicable and binding on both the parties. The energy meters shall not be interfered with, tested or checked except in the presence of representatives of company and APTRANSCO. If any of the meters is found to be registered inaccurately, the affected meter will be immediately replaced. The meters will be checked in presence of both the parties on mutually agreed periods. If during the test checks both the meters are found beyond permissible limits of error, both the meters shall be immediately replaced and the correction applied to the consumption registered by the main meter to arrive at the correct energy exported for billing purposes for the period of one month up to the time of test check, computation of exported energy for the period thereafter till next monthly reading shall be as per the replaced meter. Corrections in exported energy shall be applicable to the period between the two previous monthly reading and the date and time of test calibration in the current month when error is observed.

Power generation, export and auxiliary consumption are being recorded at the plant from the installed meters. However, for applying monthly bill to APTRANSCO the meter readings will be taken on 24<sup>th</sup> of every month by APTRANSCO officials in presence of company representatives and readings will be jointly certified.



The following log sheets are being maintained for the critical equipment of the plant and readings are being recorded on day to day basis:

1. Turbine log
2. Boiler log
3. Electrical log

Emission levels are being monitored as per the statutory requirement. Plant emission levels are being monitored and the results are being sent to APPCB. For this purpose, the service of external agency is being utilized.



**Appendix A**  
**Abbreviations**

AP	Andhra Pradesh
APEREC	Andhra Pradesh Electricity Regulatory Commission
APPCB	Andhra Pradesh Pollution Control Board
APTRANSCO	Transmission Corporation of Andhra Pradesh
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
Cm	Centimeter
CO <sub>2</sub>	Carbon Dioxide
DPR	Detailed Project Report
GHG	Greenhouse Gas
IPCC	Inter governmental Panel on Climate Change
IPP	Independent Power Producers
IREDA	India Renewable Energy Development Agency
Kcal	Kilo Calories
Kg	Kilogram
KM	Kilometer
KMS	KMS Power Private Limited
KP	Kyoto Protocol
KW	Kilowatt
KV	Kilovolts
kWh	Kilowatt hour
LP	Low Pressure
MNES	Ministry of Non-Conventional Energy Sources
MT	Metric Tons
MU	Million Units
MW	Megawatt
NEDCAP	Non Conventional Energy Development Corporation of Andhra Pradesh
NGO	Non Government Organizations
NOC	No Objection Certificate
PDD	Project Design Document
PIN	Project Idea Note
PLF	Plant Load Factor
PPA	Power Purchase Agreement



QA	Quality Assurance
QC	Quality Control
RE	Renewable Energy
SEB	State Electric Board
STG	Steam Turbine Generator
T&D	Transmission and Distribution
TJ	Tera Joules
UNFCCC	United Nations Framework Convention on Climate Change



**Appendix B**  
**REFERENCE LIST**

<b>Sr. No</b>	<b>References</b>
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) <a href="http://cdm.unfccc.int">http://cdm.unfccc.int</a>
2.	Website of United Nations Framework Convention on Climate Change, <a href="http://unfccc.int">http://unfccc.int</a>
3.	Approved baseline and monitoring methodologies for CDM activities <a href="http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html">http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html</a>
4.	UNFCCC decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol
5.	UNFCCC document: Annx B to attachment 3, Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories
6.	Detailed project report on 6 MW Biomass based power project – KMS Power Private Limited
7.	Website of Central Electric Authority (CEA), Ministry of Power, Govt. of India- <a href="http://cea.nic.in">http://cea.nic.in</a>
8.	CEA published document “16 <sup>th</sup> Electric Power Survey of India”
9.	Website of APGENCO, <a href="http://www.apgenco.com">www.apgenco.com</a>
10.	Website of Ministry Non-Conventional Energy Sources (MNES), Government of India, <a href="http://mnes.nic.in">http://mnes.nic.in</a>
11.	Website of Indian Renewable Energy Development Agency (IREDA), <a href="http://ireda.nic.in">http://ireda.nic.in</a>
12.	Andhra Pradesh Power Profile at <a href="http://www.bisnetworld.net/bisnet/states">www.bisnetworld.net/bisnet/states</a>
13.	<a href="http://www.infraline.com/power/">www.infraline.com/power/</a>
14.	APERC tariff order, R.P. No.84 / 2003 in OP No 1075 / 2000 dated 20.03.2004.
15.	Website of Climate Change Cell, Ministry of Environment & Forest, Govt. of India. <a href="http://envfor.nic.in">http://envfor.nic.in</a>