

REVISED MONITORING PLAN

Project 0374: KMS Power 6 MW Renewable Sources Biomass Power project

Version 02

KMS POWER PRIVATE LIMITED
1071, Road No 44, Jubilee Hills,
Hyderabad – 500033,
Andhra Pradesh, India.
e- Mail: kms@greenkogroup.com

KMS Power 6 MW Renewable Sources Biomass Power Project Plant located at Lakkaraju Garlapadu, Sattenapalli Mandal, Guntur Dist., Andhra Pradesh, India, has been commissioned and is operational since 22.07.2002. The Plant is using renewable Biomass fuels like Rice Husk, Cotton & Chilly Stalks, Prosopis Julie flora etc.

The purpose of this Revised Monitoring Plan is to calculate the Greenhouse Gases emission reduction achieved during the present monitoring period. The project was registered with CDM Executive Board on 04 June 2006.

During the first Monitoring Period (23 July 2002 to 24 June 2006) plant exported 143.9 Million units to the grid and issued 89596 CERs.

During the second Monitoring Period (25 June 2006 to 23 July 2007) plant exported 36.5 Million units to the grid and issued 27790 CERs.

We have revised the following sections from the original registered PDD for better implementation of the Monitoring procedure.

D.3 Data to be monitored

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ID number (Please use numbers to ease cross referencing to table D.6)	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	Calculated	Daily	100%	Electronic	2 years	Based on difference between energy generated and energy exported
D.3.3	Power	Electricity export	kWh	Measured	Daily Measurement	100%	Electronic	2 years	Based on reading from tri - vector

					and Monthly reading				meter in AP Transco sub station
D.3.4	Power	Electricity import from grid	kWh	Measured	Monthly	100%	Electronic	2 years	Based on reading from tri – vector meter in AP Transco sub station
D.3.5	Fuel	Biomass used	MT	Measured	Daily	100%	Paper	2 years	
D.3.6	Fuel	Avg. calorific value of Biomass used	Kcal/kg	Measured	Monthly	100%	Paper	2 years	Through sample testing in the lab. Tested monthly only if the source of Biomass is different.
D.3.7	Fuel	Coal used	MT	Measured	Daily	100%	Paper	2 years	
D.3.8	Fuel	Carbon content in coal	%	Measured	For each batch of coal	Grab Sample	Paper	2 years	Through sample testing in the lab. Tested each batch only if the source of material is different.
D.3.9	Fuel	Calorific value of coal	Kcal/kg	Measured	For each batch of coal	Grab sample	Paper	2 years	Through sample testing in the lab. Tested each batch only if the source of material is different.
D.3.10	Fuel	Diesel used	L	Measured	Daily	100%	Paper	2 years	Based on level drop in the diesel tank attached to the DG set
D.3.11	Fuel	Net calorific value of Diesel	Kcal/kg			100%	Paper	2 years	Standard Value as published by IPCC or supplier data as available

D.3.12	Fuel	Density of Diesel	Kg/L			100%	Paper		Density of diesel from IOCL website (http://www.iocl.com/Products/DieselSpecifications.pdf) will be used
D.3.13	Fuel	Oxidation factor of Diesel				100%	Paper	2 years	IPCC value has been used as no country specific value is available

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

D.4 Quantitative explanation on 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 D.3.10	Low	<i>The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency</i>
D.3.11	Low	Use of standard / IPCC value
D.3.12	Low	Use of standard / IPCC value

Annex 4

Monitoring plan

1. Electricity Generation: Electricity generation from the plant is monitored and recorded continuously on daily basis using the generation meter installed in the control room of the plant. Generation meter is calibrated on yearly basis by third party.

2. Electricity Export: Electricity exported to the grid is monitored and recorded continuously on daily basis and cross checked on monthly basis from joint meter readings taken from the energy meters installed at APTRANSCO substation on 21st day of every month. Meter readings for the electricity exported to the Grid are recorded by representatives of APTRANSCO and the Company and the readings are jointly signed by both the parties as a proof of export of Power to the grid from power plant. These joint meter readings are the basis for the invoices raised by the Company. Export meters are calibrated on yearly by AP TRANSCO.

3. Electricity Import: As per the registered PDD (UNFCCC No. 0374), the monitoring plan did not include the monitoring of electricity imported from the grid, which is required for emergency operations of the Plant when the plant is not generating power. However, the same was being monitored since the project was commissioned and now has been included in the CDM monitoring plan to improve the monitoring plan of the registered PDD.

Electricity imported from the grid is monitored from energy meters installed at APTRANSCO substation on 21st day of every month. A joint meter reading for the electricity imported from the grid is recorded by representatives of APTRANSCO and Company and the readings are jointly signed by both the parties. The emissions due to import of electricity are considered as Project emissions while arriving the emission reductions. Therefore, the proposed revision is an improvement from the existing monitoring plan and has a positive impact on the monitoring process and provides a conservative approach for estimation of the emission reductions.

4. Auxiliary Consumption: As per the registered PDD, the monitoring methodology for auxiliary consumption for the plant operations is reported as 'Measured' and the explanation provided in the PDD for arriving the Auxiliary Consumption was "based on the difference between electricity generated and exported". The Auxiliary Consumption was reported on basis of calculation in the Monitoring Report as difference between electricity generated and exported. In this view the PP is proposing a revision in the monitoring plan to change the method of capturing the auxiliary consumption from 'Measured' to 'Calculated' for better information for the registered monitoring plan.

The readings of the Auxiliary meter has no significance while calculating emission reductions and are used only to find out the actual auxiliary consumption of major utilities within the plant and to take appropriate action to keep the auxiliary consumption within the prescribed limits. PP calculates the auxiliary consumption based on the difference between generation meter and export meter readings mainly to have better accuracy. Hence, the same is included in the monitoring plan.

The auxiliary consumption will be "calculated" instead "of measured" and this is more accurate as the difference is calculated from the gross generation meter and the export meter which are both meters of high class accuracy (0.2). Monitoring of auxiliary consumption is only for the internal purpose of the plant and does not impact emission reduction calculations.

5. Consumption of Biomass Fuel (all kinds): The Biomass fuel of all kinds on receipt in the Plant is weighed in the Electronic Weigh Bridge installed in the entry of the Plant and unloaded in the fuel storage yard. The biomass fuel after necessary preparation is fed to the Boiler as per the requirement and consumption will be recorded on daily basis.

6. Calorific value of the Biomass fuels (all kinds): The calorific value of the Biomass fuel being used is measured in the in-house laboratory as per the approved internal procedures and average value is recorded on monthly basis.

7. Consumption of Coal: Coal on receipt in the Plant is weighed in the Electronic Weigh Bridge installed in the Plant and unloaded in the storage yard. Coal is fed to the Boiler as and when required and consumption will be recorded accordingly.

8. Carbon content and Calorific value of Coal: Carbon content in the each batch of coal received is being considered as per the analysis reports provided by the coal supplier or as per the test reports of third party reputed laboratories authorized by the Company.

9. Diesel Consumption: As per the registered PDD (UNFCCC No. 0374), the monitoring plan did not include the monitoring of diesel consumed for emergency operations of the DG set at the plant site in case of total blackout situation. However, the same was being monitored since the project was commissioned and now has been included in the CDM monitoring plan to improve the monitoring plan of the registered PDD.

The diesel consumption that is used for emergency purposes is accounted as project emissions which are as per point 9 in the monitoring methodology for AMS 1D version 7.

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

Turbine log

Boiler log
Electrical log

11. 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.

Therefore, the proposed revision is an improvement from the existing monitoring plan and has a positive impact on the monitoring process and provides a conservative approach for estimation of the emission reductions.

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:

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The project proponent uses biomass as fuel. However, the project proponent, in case of exigencies uses coal as fuel instead of biomass. The CO₂ emissions during the usage of coal have been calculated in the following manner:

1. Using IPCC standard CO₂ emission factor

$$CE = Q \times CC \times EFC_c$$

Where,

CE_c - 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 CO₂/kcal

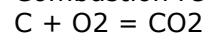
OR

2. Using actual carbon content of the coal

CO₂ Emission [in kgs]= Stoichiometric CO₂ from carbon content of coal [based on total carbon content]

To have an estimate of the project CO₂ emission quantity due to combustion of coal along with the biomass, total carbon content of the coal should be known.

Combustion reaction for CO2 emission is as under.



Assuming complete combustion of coal, following formula can be used for conservative estimation of CO2 emissions.

$$CE = \left(\frac{44}{12} \right) * C * Q$$

Where,

CE - 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.

The project uses diesel generator set occasionally for startup operation in case of non availability of power from grid. The emissions due to diesel consumption have been calculated in the following manner

Emissions due to diesel consumption = [(Diesel consumed in liters x calorific value (TJ/kg) x density (kg/l))] x IPCC emission factor (tCO2/TJ) x oxidation factor

Project Emissions = Emissions due to coal + Emissions due to Diesel

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:

Step by step calculation using combined margin methodology of CO2 emissions due to burning of coal, diesel and gas for power generation and emission reductions by the project activity is as under.

Step 1	:	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
Step 2	:	Net operating emission factor for gas, diesel	=	Step 1 is to be repeated for gas and diesel
Step 3	:	Operating margin factor	=	Net emission factor for coal + Net emission factor for gas + Net emission factor for Diesel
Step 4	:	Built Margin factor	=	Weighted average of emission factors of most recent 20% plants or 5 most recently built plant, whichever is higher
Step 5	:	Average of operating and build margin factor	=	(operating margin factor + built margin factor)/2
Step 6	:	Net Units exported to APTRANSCO		Total Export to grid – Total import from the grid.
Step 7	:	CO2 emission reduction	=	Units exported to AP grid x Average of operating and build margin factor