

Revision in Monitoring Plan of Registered PDD of Kalyani Steels Limited

Title of the project activity: Electricity generation at 8 MW captive power plant using enthalpy of flue gases from blast furnace operations of Kalyani Steels Limited, in Karnataka state of India.

UNFCCC Reference Number: 0427

PDD Version number: 3

PDD Date: 17 August 2006

SECTION D. Application of a monitoring methodology and plan

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

The adopted monitoring methodology called “*Consolidated monitoring methodology for waste gas and/or heat for power generation*”¹ has been used.

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

The adopted monitoring methodology has been chosen based on the following reasons:

- ✓ project activity involves electricity generation from combustion of waste gases produced in existing industrial facility;
- ✓ it displaces alternate potential for electricity generation with fossil fuels in the electricity grid or captive electricity generation with fossil fuels;
- ✓ it has provisions to use more of waste gases in future, if there is a planned capacity increment to the existing industrial facility;
- ✓ there is no fuel switch in the industrial process from which waste gases are produced; and
- ✓ the monitoring methodology can be used in conjunction with approved baseline methodology ACM0004.

¹ Approved consolidated monitoring methodology ACM0004.

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to D.3)	Data variable	Source of data	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)	Comment
1. Q_i	Quantity of furnace oil (auxiliary fuel) used by project activity	Power Plant records	tonnes	m	Continuously	100%	Electronic/ paper	To be measured and used for estimation of project emissions. The quantity of furnace oil is measured on-line, and is reported daily in liters that is converted to tonnes for project activity calculations.
2. NCV_i	Net calorific Value of furnace oil	CEA and IPCC	TJ/tonne	m	Monthly	Random	Electronic/ paper	To be measured and used for estimation of project emissions.
3. EF_i	Carbon emission factor for furnace oil	IPCC	tC/TJ	m	Monthly	Random	Electronic/ paper	In the absence of India specific values, IPCC recommended values have been used.

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

The project emissions are calculated for use of furnace oil as auxiliary fuels for generation startup, in emergencies, provision of additional heat gain to waste gases before entering the Waste Heat Recovery Boiler. The project emission (PE_y) during any year will be using the following formulae:

$$PE_y = \sum Q_i * NCV_i * EF_i * (44/12) * OXID_i \dots \dots \dots (1)$$

LPG is used in insignificant quantities (expected to be about 10 kg per year) in the project activity for emergency purposes only. Hence, project emission due to this is not considered.

D.2.1.3. Relevant data necessary for determining the <u>baseline</u> of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :								
ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
4. EG _{GEN}	Total Electricity Generated	Power Plant records	MWh/yr	m	Continuously	100%	Electronic	Meters at plant and DCS will measure the data. Manager in-charge will be responsible for regular calibration of meter.
5. EG _{AUX}	Auxiliary Electricity	Power Plant records	MWh/yr	m	Continuously	100%	Electronic	Same as above.
6. EG _y	Net Electricity supplied to KSL facility	Power Plant records	MWh/yr	c	Continuously	100%	Electronic	Calculated from the above measured parameters.
7. EF _{OM,y}	Simple OM emission factor for relevant grid	Estimated	tCO ₂ /MWh	C	Once during validation	100%	Electronic	Calculated as per ACM0002. This value has been fixed <i>ex-ante</i> .
8. EF _{BM,y}	BM emission factor for relevant grid	Estimated	tCO ₂ /MWh	C	Once during validation	100%	Electronic	Calculated as per ACM0002. This value has been fixed <i>ex-ante</i> .
9. F _{i,j,y}	Amount of fossil fuel consumed by each fossil fuel based power plant in relevant grid	Official records of grid, electricity boards, CEA	t	E	Once during validation	100%	Electronic	Used for calculating emission coefficients in Simple OM and BM. These values have been fixed <i>ex-ante</i> .
10. COEF _{i,k}	CO ₂ emission coefficient for each fossil fuel based power plant in relevant grid	Estimated with above data	tCO ₂ /t	E	Once during validation	100%	Electronic	Used for calculating emission coefficients in Simple OM and BM. These values have been fixed <i>ex-ante</i> .

D.2.1.3. Relevant data necessary for determining the <u>baseline</u> of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :								
ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
11. GEN _{i,y}	Electricity generation by each fossil fuel based power plant in relevant grid	Official records of grid, electricity boards, CEA	MWh/yr	E	Once during validation	100%	Electronic	Used for calculating emission coefficients in Simple OM and BM. These values have been fixed <i>ex-ante</i> .
12. EF _y	CM CO ₂ emission factor for relevant grid	Estimated with above data	tCO ₂ /MWh	C	Once during validation	100%	Electronic	Calculated as weighted average of OM and BM. This value has been fixed <i>ex-ante</i> .

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

As mentioned earlier under section B.3, a combined margin approach has been used to calculate the baseline emissions for the various electricity grids considered. The emission factor is calculated as follows:

$$BE_y = EG_y * EF_y \dots \dots \dots (2)$$

$$EF_y = (EF_{OM,y} + EF_{BM,y}) / 2 \dots \dots \dots (3)$$

$$EF_{OM,y} = [\sum (F_{i,j,y} * COEF_{i,j}) / \sum GEN_{j,y}] \dots \dots \dots (4)$$

$$COEF_{i,j} = NCV_i * EF_{CO2,i} * OXID_i \dots \dots \dots (5)$$

EF_{BM,y} is also calculated as in equations (4) and (5) above.

A 3-year average, based on the most recent statistics available at the time of PDD submission has been used in the operating margin calculations, thereby fixing the value *ex-ante* of operating margin for southern regional grid, as per the provisions of ACM0002, for the entire crediting period.

For build margin calculations, power generation by project types based on fuel used from recent capacity additions to the system for which capacity additions defined as the greater of most recent 20% of existing plants or the 5 most recent plants, have been used. The value of build margin emission factor for southern regional grid has been fixed *ex-ante* for the entire crediting period.

The values of operating margin, build margin and combined margin for the southern regional grid, fixed *ex-ante* for this PDD are as follows:

Parameter	Value (tCO ₂ /MWh)
Operating Margin	1.261
Build Margin	0.960
Combined Margin	1.110

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

Not opted for.

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.):

Not applicable.

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	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)	Comment

No leakage is considered, as per adopted baseline methodology.

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

Not applicable.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

The emission reduction (**ER_y**) by the project activity during a given year *y* is the difference between the baseline emissions though substitution of electricity generation with fossil fuels (**BE_y**) and project emissions (**PE_y**), as follows:

$$\mathbf{ER}_y = \mathbf{BE}_y - \mathbf{PE}_y \dots \dots \dots (6)$$

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1, 2, 3	Low	This data will be required for the calculation of project emissions.
4, 5, 6	Low	This data will be used for the calculation of project electricity generation.
7, 8, 12	Low	This data is calculated, so does not need QA procedures. Further, these values are fixed <i>ex-ante</i> .
9, 10, 11	Low	This data will be required for the calculation of baseline emissions (from grid electricity) and has been obtained through published and official sources.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The project will be operated and managed by KSL who is also the project proponent. KSL will ensure safety in operation of the plant as per environmental management plan prepared for the site. The site also has an ISO 14000 based Environmental Management System (EMS) in place. Accordingly, the monitoring plan used herein will become an integral part of the Environmental Management Programmes and would be constituent of operational and management structure of this EMS.

D.5 Name of person/entity determining the monitoring methodology:

Dr. P Ram Babu of PricewaterhouseCoopers (P) Limited, has assisted the Sponsor in determining the baseline and monitoring methodology. PricewaterhouseCoopers (PwC) are assisting the project sponsor in developing the Project Design Document (PDD) and defence of the PDD in Host Government Approval (HGA) and validation procedure. PwC, formed by the global merger of Pricewaterhouse and Coopers & Lybrand in 1998, is the world's largest financial and professional services organisation with 125,000 people in 142 countries and 867 offices worldwide.