

MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

CONTENTS

- A. General description of the project activity
 - A.1. Brief description of the project activity
 - A.2. Project participants
 - A.3. Location of the project activity
 - A.4. Technical description of the project
 - A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity
 - A.6. Registration date of the project activity
 - A.7. Crediting period of the project activity and related information
 - A.8. Name of responsible person(s)/entity(ies)

- B. Implementation of the project activity
 - B.1. Implementation status of the project activity
 - B.2. Revision of the monitoring plan
 - B.3. Request for deviation applied to this monitoring period
 - B.4. Notification or request of approval of changes

- C. Description of the monitoring system

- D. Data and parameters
 - D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors Data and parameters used to calculate project emissions
 - D.2. Data and parameters monitored

- E. Emission reductions calculation
 - E.1. Baseline emissions calculation
 - E.2. Project emissions calculation
 - E.3. Leakage calculation
 - E.4. Emission reductions calculation
 - E.5. Comparison of actual emission reductions with estimates in the registered CDM-PDD
 - E.6. Remarks on difference from estimated value

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 01 dated 03/03/2012

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 Ref. No.: 0427

Monitoring Period # 6 - 01/01/2011 to 31/12/2011 (first and last days included 01/01/2011 - 31/12/2011)

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

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The project activity involves generation of electricity from waste gases from existing iron manufacturing facilities of Kalyani Steels Limited (KSL). The generated electricity is used for captive consumption within the industrial facility thereby partially displacing electricity that would have otherwise been purchased from the grid or generated as captive power using fossil fuel.

KSL operates an integrated steel plant that involves use of 2 no's of mini blast furnaces (MBF) from where blast furnace gases are generated during the iron making process. A part of the MBF gases from each MBF is used to heat the blast air in the air pre-heater; the balance quantity is waste gases. These waste gases are ducted to a common duct with a tap-off provision to a boiler in the captive power plant (CPP). There is also provision to flare these waste gases if not used for boiler firing. The technology involves fully PLC controlled state of the art equipment and control systems.

The construction start date for the project activity (4th August 2003) is taken as the project start date; the commercial operation of the project activity commenced from 11th February 2005. The project has been registered as CDM activity on 29th September 2006.

The total emission reduction achieved in this monitoring period (01/01/2011 - 31/12/2011) is **35,196 tCO₂ e.**

A.2. Project Participants

>> The project has the following participants as on date:

- Kalyani Steels Limited (India - Host)
- Carbon Asset Services Sweden AB (Sweden)
- EDF Trading Limited (United Kingdom)
- Carbon Asset Management Sweden AB (Switzerland)

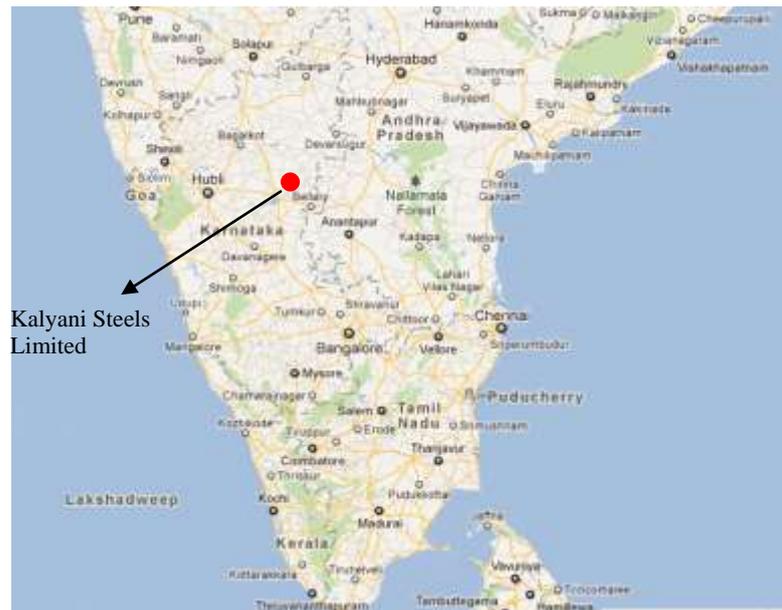
A.3. Location of the project activity:

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The project is located within the Kalyani Group's integrated steel manufacturing complex, with approximate geographical location of latitude 15°20'16"N and longitude 76°15'17"E. The site is at a distance of 130 km from Hubli and 340 km from Bangalore by road. The nearest railway station is at Ginigera about 1 km away.

The location of the project site is indicated in the map below:

Location Map

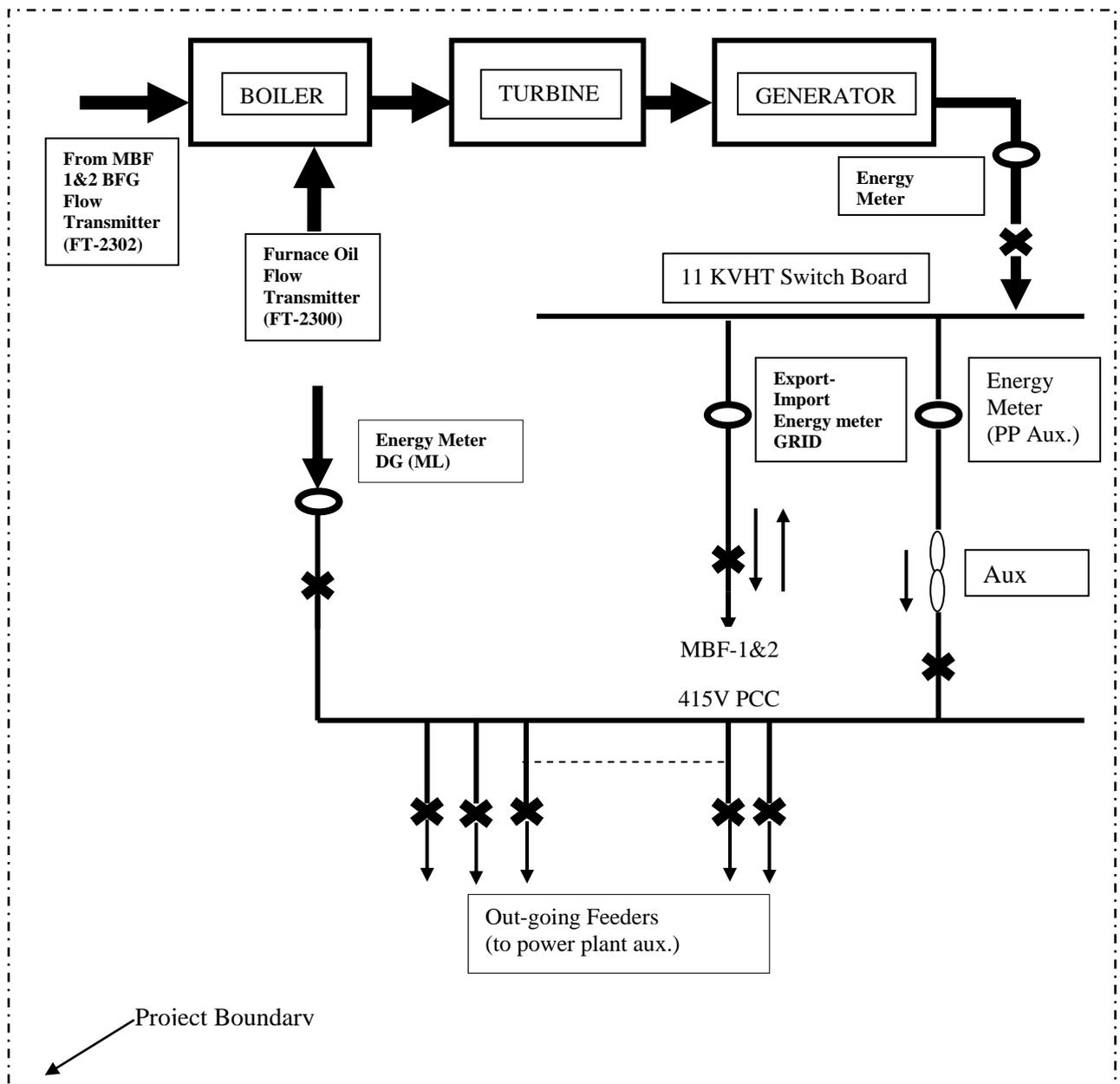


A.4. Technical description of the project

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The technology applied to the project activity has been tailor-made to recover enthalpy of MBF generated gases in a boiler specifically designed for the same, and all associated facilities for collection and transportation of these gases, and auxiliary firing of the gases to increase the heat content to facilitate generation of electricity. The technology involves fully PLC controlled state of the art equipment and control systems.

The technology employed by the project activity is based on Rankine Cycle for thermal power generation. In this technology, steam generated using MBF gases in high-pressure boiler, is allowed to expand in the steam turbine. Apart from utilizing the enthalpy of the MBF gases in the boiler, oil support is provided for continuous firing, though such support is not required during normal operating conditions. The energy obtained from the expansion of the steam in the steam turbine is utilized to generate power.



The following typical characteristics of the waste MBF gases, as described below, require specifically designed boiler mentioned earlier under this section.

- **High Inerts and Low Calorific Value:** These waste MBF gases contain very low amount of combustibles (20-22% CO) and high amounts of inerts such as Nitrogen and Carbon dioxide resulting in low calorific value. Due to low calorific value, combustion of these gases is carefully stabilized.
- **Slow Burning:** As a result of the low calorific value and high amount of inerts, the waste MBF gases burn slowly and hence in order to ensure complete combustion of these gases, higher residence time in the furnace is very essential. This higher residence time have been achieved by using larger boiler furnace and lower furnace volumetric heat release rate.

Due to such typical characteristics of the waste MBF gases, the success of the boiler largely depends on the burner design. In the project activity, a scroll burner has been used to provide spin to the waste MBF gases as they enter the furnace for ensuring high mixing energy at the point of air fuel mixing. The scroll burner also uses the principle of pre-mixing fuel with air for better combustion by injecting a stream of air into the waste MBF gas stream before it enters the furnace. The temperature of the waste MBF gases is then raised (~745 - 760° C) by its combustion. The raised temperature so reached is used in the heat exchanger to produce steam and subsequently power.

Since the project activity occasionally uses furnace oil (FO) and LPG, the purposes of such uses are described below.

- ✓ **Purpose of using Furnace Oil as support fuel:** The waste MBF gases alone cannot reach the required flame temperature at the start-up. Hence, FO is required as a support fuel to initially raise the temperature to required levels. The combustion of CO is an exothermic reaction and is self sustaining by itself; however, when waste MBF gases, which is a lean CO gas is put into a hot furnace, it tends to cool down the furnace due to its lower temperature of 40-50°C. Hence, adequate re-radiation from hot refractory lining is required to sustain the high temperature (~745 - 760° C) so reached. Therefore, in the design of the boiler, refractory lining are provided on the water wall tubes up to first 5 feet of the furnace heat transfer surface. This refractory re-radiates heat into the flame thereby enhancing the flame stability. Also, in the boiler design, for a load of less than 70% (where 100% load is 47 TPH), an oil support of only 5% is required. When operating within the boiler's maximum continuous rating (MCR) at 70 – 100% under stabilized operational conditions with waste MBF gases and subject to availability of these gases with adequate flow, consistent pressure and consistent quality in terms of gross calorific value (600-800 kCal/Nm³), the boiler provided can be operated on waste MBF gases firing alone without any support fuel. Thus, the project activity in a steady state is not dependent on fossil fuel combustion for power generation but runs on waste MBF gases.
- ✓ **Purpose of using LPG for pilot flame:** LPG is used only for ignition of FO (i.e., to start the pilot flame). It is used only for 90 seconds of the total ignition cycle of 180 seconds. The consumption of LPG is solely required for boiler start up. This happens only after the shut-downs which are very infrequent. For example, statutory boiler shut-down happens once in a year. Hence the annual consumption of LPG is insignificant. The LPG used at site is stored in cylinders of capacity 19 kg. **Thus, the project activity is not dependent** on use of FO and LPG but depends on the calorific value of the waste MBF gases. The enthalpy of the waste gases in the form of its calorific value (about 650 kCal per NM³) is utilised for power generation.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Title: "Consolidated baseline methodology for waste gas and/or heat for power generation".

Reference: Approved consolidated baseline methodology ACM0004, Version 02 dated 03 March 2006

Demonstration of Additionality for the project activity¹

As required in ACM0004, additionality has been demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" (version 2 - 28 November 2005).

A.6. Registration date of the project activity:

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The project has been registered as CDM project activity on 29th September 2006.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Start Date: 11 Feb 2005

Crediting Period: 11 Feb 2005 to 10 Feb 2015 (Fixed for 10 years)

There has not been any change in the start date of the crediting period post registration.

¹ Available at: <<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>>.

A.8. Name of responsible person(s)/entity(ies):

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Name of person/entity responsible for completing the monitoring report form (CDM-MR):

Kalyani Steels Limited.

Contact information:

Organization:	Kalyani Steels Limited
Street/P.O.Box:	Mundwa
Building:	-
City:	Pune
State/Region:	Maharashtra
Postfix/ZIP:	411 036
Country:	India
Telephone:	+91-20-26823344
FAX:	+91-20-26871808
E-Mail:	kalyani@kalyanisteels.com
URL:	www.kalyanisteels.com
Represented by:	
Title:	Executive Director
Salutation:	Mr.
Last Name:	Goyal
Middle Name:	-
First Name:	Ravindra
Department:	
Mobile:	+91 9810530636
Direct Fax:	+91 20 26821124
Direct Tel:	+91 20 26824436
Personal E-Mail:	rkgoyal@kalyanisteels.com

SECTION B. Implementation of the project activity**B.1. Implementation status of the project activity**

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The project is currently operational. The monitoring plan was implemented in compliance with the registered PDD.

Starting date of project activity

The construction start date for the project activity (04 August 2003) is taken as the project start date; the commercial operation of the project activity commenced from February 2005.

Construction Start Date: 4 August 2003

Commercial Operation: 11 February 2005.

Actual operation of the project activity during this monitoring period

The project underwent shutdown due to routine operating constraints.

Following is a table indicating the number of days of shut down due to maintenance and over-haul activities in the plant during the monitoring period (01/01/2011 – 31/12/2011).

Month	Number of days of shut down due to maintenance and overhaul activity
January	0
February	3
March	0
April	0
May	0
June	2
July	1
August	Please refer note below
September	
October	
November	0
December	0

Note: The power plant was shut down from 03/08/2011 to 05/10/2011 (64 days) since the steel plant was shut down (due to non availability of iron ore).

The daily operational summary of the power plant during the current monitoring period (01 January 2011 to 31 December 2011) will be submitted to DOE during site visit. The details are also provided in the ER calculation excel sheet.

Events affecting the applicability of the methodology

No events or situations occurred that could impact the applicability of the methodology. There were therefore no issues from events or situations to address.

B.2. Revision of the monitoring plan

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An ambiguity in monitoring of grid emission factor was noticed during the third verification. Revision in Monitoring plan was sought. The revision was accepted by UNFCCC on 17 January 2009.

B.3. Request for deviation applied to this monitoring period

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No request for deviation has been applied to this monitoring period.

B.4. Notification or request of approval of changes

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No notification or request of approval of changes has been made.

SECTION C. Description of the monitoring system

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Data collection procedures:

Data generation: Description of meters (for individual parameters) used to generate data, has been explained in the section D.2.

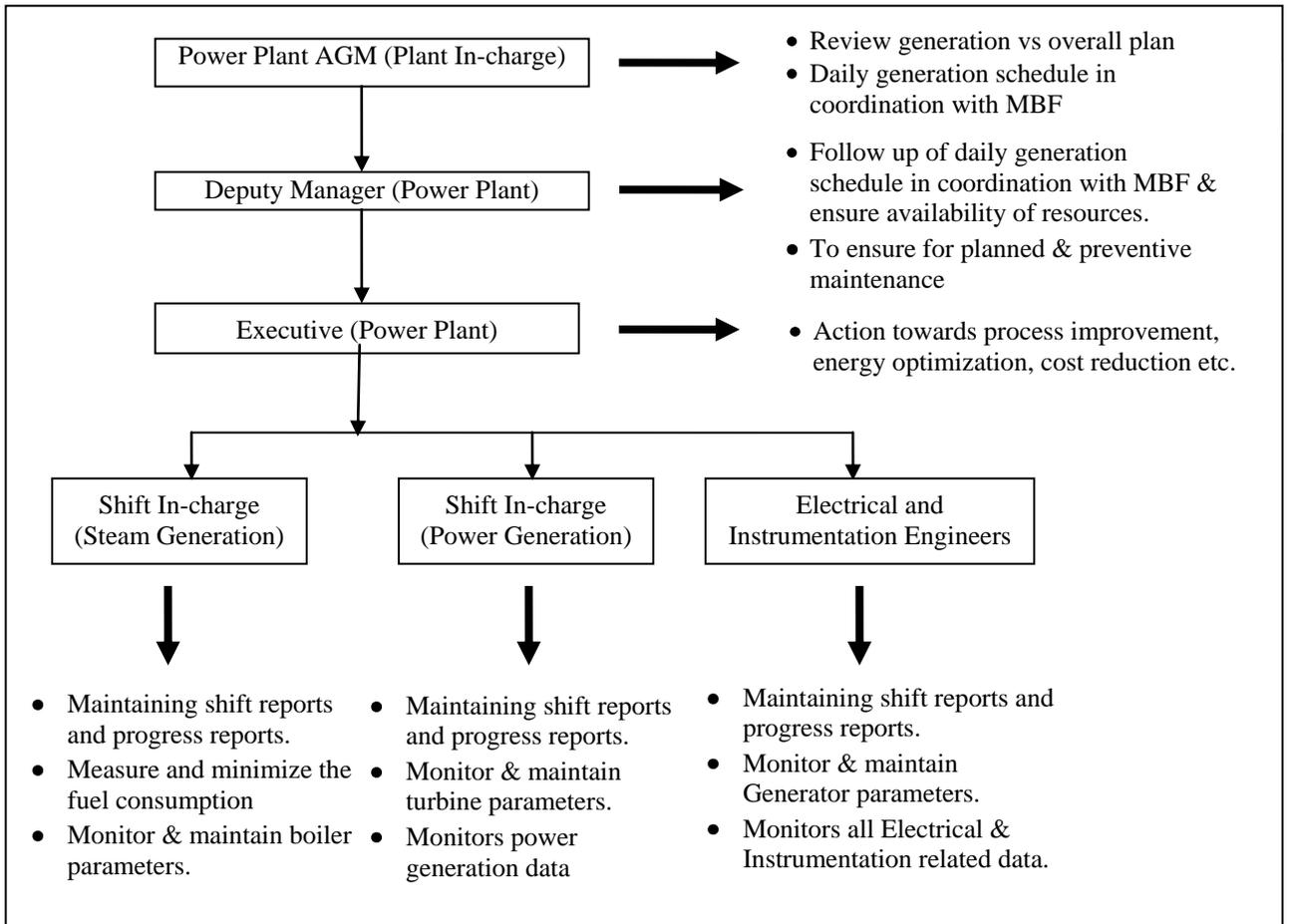
Data recording: The shift in-charge of the PAPP will read the meters mentioned in section D.2 daily. The data are written down in log sheets and also kept in electronic form.

Data aggregation: The calculated net power output per month is summed over the monitoring period.

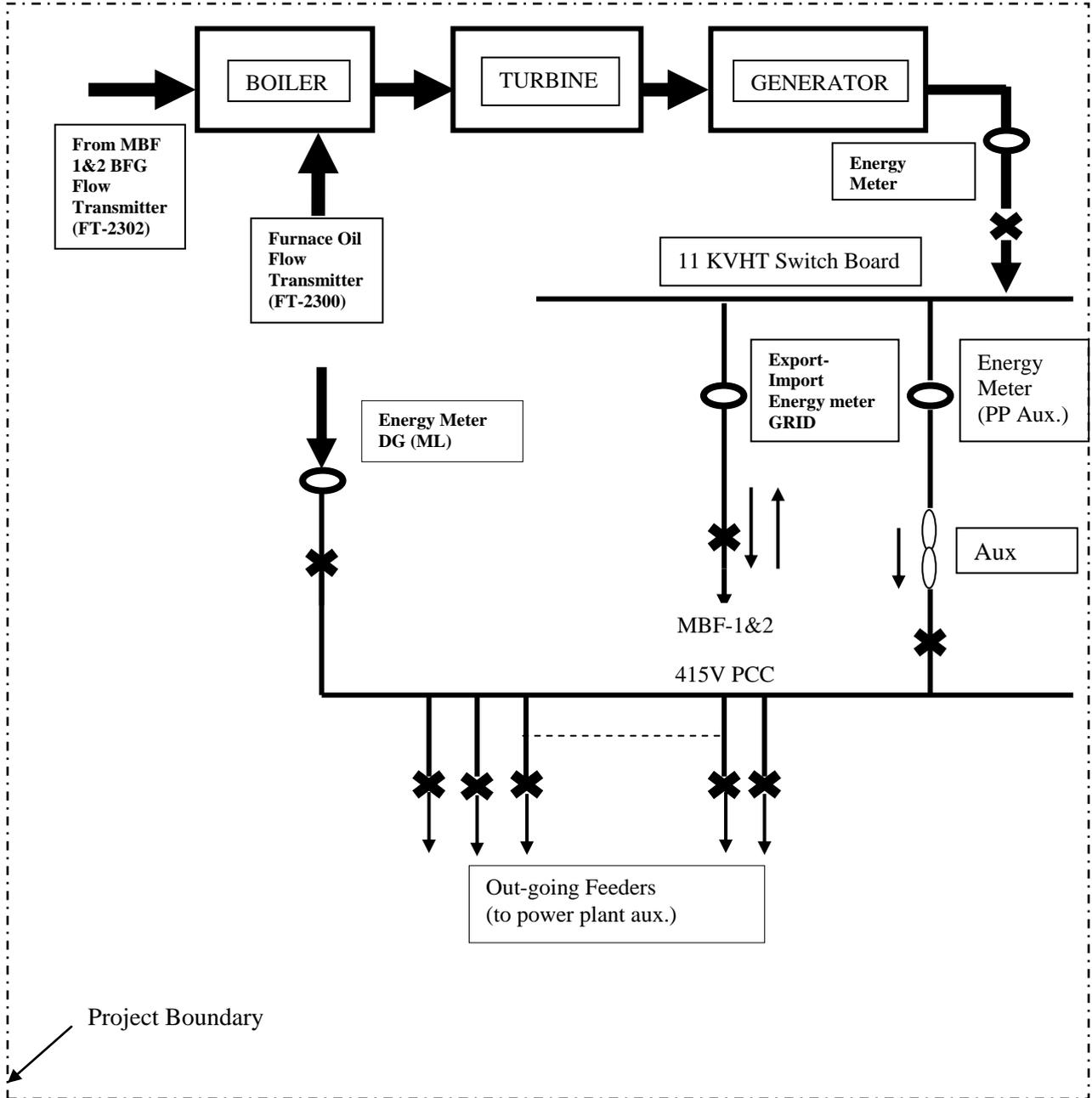
Calculation: The detailed emission reduction calculations are described in section D.2 and section E of the monitoring report. Total quantity of electricity generated by the project activity and auxiliary electricity consumed by the project activity are monitored by the specified meters. Net power generated by the PAPP is the total quantity of electricity generated by project activity minus auxiliary electricity consumed by the project activity. Net power generated multiplied by emission factor results in the baseline emissions. See section E for calculations of emission reductions.

Reporting: The monitored parameters are recorded in site log books and on daily basis. The calculated values are included in an excel sheet and reported in the CDM-MR.

Organizational structure:



Line diagram showing all relevant monitoring points:



Line diagram of the KSL power plant and Project Boundary

Emergency procedures for the monitoring system:

The shift in-charge will notify the maintenance team / manufacturer of the equipment in case there is doubt about the correct functioning of the meters mentioned in the monitoring plan. In that case, manufacturer or the maintenance team will check, repair and where necessary replace the meters.

SECTION D. Data and parameters

The monitoring of the project activity is carried out as per the monitoring plan laid out in the registered PDD. The parameters monitored in the project activity are presented in the table below:

ID number	Data Type	Data variable	Data unit	Recording frequency	Data Source	Equipment used	Value of the Variable
1. Qi	Mass	Quantity of furnace oil (auxiliary fuel) used by project activity	tonnes	Continuously	Measured value	Furnace oil flow transmitter.	958.246
2. NCV _i	Energy	Net calorific Value of furnace oil	KCal/Kg	Monthly	Provided by the supplier	Not Applicable	Monthly values reported in emission reduction calculation excel
3. EF _i	Emissions	Carbon emission factor for furnace oil	tC/TJ	Monthly	CEA, IPCC	Not Applicable	21.100
4. EG _{GEN}	Electricity	Total Electricity Generated	MWh/yr	Continuously	Measured value	Energy meters	37,608..497
5. EG _{AUX}	Electricity	Auxiliary Electricity	MWh/yr	Continuously	Measured value	Energy meters	3,256.127
6. EG _y	Electricity	Net Electricity supplied to KSL facility	MWh/yr	Continuously	Calculated value	Not Applicable	34,352.370
7. EF _{OM,y}	Emissions	Simple OM emission factor for relevant grid	tCO ₂ /MWh	Once during validation ²	CEA database.	Not Applicable	1.261
8. EF _{BM,y}	Emissions	BM emission factor for relevant grid tCO ₂ /MWh	tCO ₂ /MWh	Once during validation	CEA database.	Not Applicable	0.960
9. F _{i,j,y}	Mass	Amount of fossil fuel consumed by each fossil fuel based power plant in relevant grid	T	Once during validation	CEA database.	Not Applicable	-
10. COEF _{i,k}	Emissions	CO ₂ emission coefficient for each fossil fuel based power plant in relevant Grid	tCO ₂ /t	Once during validation	CEA database.	Not Applicable	-
11. GEN _{i,y}	Electricity	Electricity generation by each fossil fuel based power plant in relevant Grid	MWh/yr	Once during validation	CEA database.	Not Applicable	-
12. EF _y	Emissions	CM CO ₂ emission factor for relevant grid	tCO ₂ /MWh	Once during validation	CEA database.	Not Applicable	1.110

² All the monitoring parameters with recording frequency once during validation have been fixed *ex-ante*. Refer revised monitoring plan dated 17 January 2009

<http://cdm.unfccc.int/Projects/DB/BVQI1146639607.87/MonitoringPlanRevisions/01/RevisedMonitoringPlan>

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	$EF_{BM,v}$
Data unit:	tCO ₂ e/MWh
Description:	Build Margin Emission Factor of South Regional Electricity Grid
Source of data used:	Central Electricity Authority, Ministry of Power, Government of India.
Value applied:	0.960
Justification of the choice of data or description of measurement methods and procedures actually applied :	.
Any comment:	Calculated as per ACM0002. This value has been fixed <i>ex-ante</i>

Data / Parameter:	$EF_{OM,v}$								
Data unit:	tCO ₂ e/MWh								
Description:	Operating Margin Emission Factor of South Regional Electricity Grid								
Source of data used:	Central Electricity Authority, Ministry of Power, Government of India.								
Value applied:	<table border="1"> <tr> <td>2001 – 02</td> <td>1.3825</td> </tr> <tr> <td>2002 – 03</td> <td>1.3578</td> </tr> <tr> <td>2003 – 04</td> <td>1.0471</td> </tr> <tr> <td>Average OM</td> <td>1.261</td> </tr> </table>	2001 – 02	1.3825	2002 – 03	1.3578	2003 – 04	1.0471	Average OM	1.261
2001 – 02	1.3825								
2002 – 03	1.3578								
2003 – 04	1.0471								
Average OM	1.261								
Justification of the choice of data or description of measurement methods and procedures actually applied :									
Any comment:	Calculated as per ACM0002. This value has been fixed <i>ex-ante</i>								

Data / Parameter:	EF_v
Data unit:	tCO ₂ e/MWh
Description:	Combined Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	Central Electricity Authority, Ministry of Power, Government of India.
Value applied:	1.110
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Calculated as per weighted average of OM and BM. This value has been fixed <i>ex-ante</i>

Data / Parameter:	$F_{i,i,v}$
Data unit:	T
Description:	Amount of fossil fuel consumed by each fossil fuel based power plant in Southern Regional Electricity Grid
Source of data used:	Central Electricity Authority, Ministry of Power, Government of India
Value applied:	Values are as per registered PDD
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Used for calculating emission coefficients in Simple OM and BM .These values have been fixed <i>ex-ante</i>

Data / Parameter:	COEF_{i,k}
Data unit:	tCO ₂ /t
Description:	CO ₂ emission coefficient for each fossil fuel based power plant in Southern Regional Electricity Grid
Source of data used:	Estimated with above data
Value applied:	Values are as per registered PDD
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Used for calculating emission coefficients in Simple OM and BM . These values have been fixed <i>ex-ante</i>

Data / Parameter:	GEN_{i,y}
Data unit:	MWh/yr
Description:	Electricity generation by each fossil fuel power plant in Southern Regional Electricity Grid
Source of data used:	Central Electricity Authority, Ministry of Power, Government of India
Value applied:	Values are as per registered PDD
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Used for calculating emission coefficients in Simple OM and BM . These values have been fixed <i>ex-ante</i>

D.2. Data and parameters monitored

Data / Parameter:	Q_i						
Data unit:	Tonnes						
Description:	Quantity of furnace oil (auxiliary fuel) used by project activity						
Measured /Calculated /Default:	Measured						
Source of data:	Furnace oil flow transmitter.						
Value(s) of monitored parameter:	958.246						
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations						
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p><u>Type of monitoring equipment:</u> Furnace oil flow transmitter <u>Accuracy class:</u> 0.5 <u>Calibration:</u> The furnace oil flow transmitter is factory calibrated and does not require calibration at the plant. After installation, only zeroing is required under no flow condition. Letter to this effect from the manufacturer of the equipment will be provided to the DOE.</p> <table border="1"> <thead> <tr> <th>Monitoring Equipment</th> <th>(Serial Number)</th> <th>Calibration details</th> </tr> </thead> <tbody> <tr> <td>Furnace oil flow transmitter</td> <td>Meter Identification No: 733794 – 2003 Sensor: 1700R13ABMEZZZ and R100S129NVBMEZZZZ</td> <td>External calibration not required as per meter manufacturer's letter (12 May 2010) Only zeroing is recommended by meter manufacturer.</td> </tr> </tbody> </table>	Monitoring Equipment	(Serial Number)	Calibration details	Furnace oil flow transmitter	Meter Identification No: 733794 – 2003 Sensor: 1700R13ABMEZZZ and R100S129NVBMEZZZZ	External calibration not required as per meter manufacturer's letter (12 May 2010) Only zeroing is recommended by meter manufacturer.
Monitoring Equipment	(Serial Number)	Calibration details					
Furnace oil flow transmitter	Meter Identification No: 733794 – 2003 Sensor: 1700R13ABMEZZZ and R100S129NVBMEZZZZ	External calibration not required as per meter manufacturer's letter (12 May 2010) Only zeroing is recommended by meter manufacturer.					

Measuring/ Reading/ Recording frequency:	Measured continuously
Calculation method (if applicable):	The quantity of Furnace oil consumed is measured in litres; it is then converted to quantity in tonnes based on the density values provided by the fuel supplier.
QA/QC procedures applied:	The project activity is being operated under internationally accepted ISO 9001 and ISO 14001 based quality and environmental management systems.

Data / Parameter:	NCV_i
Data unit:	TJ/tonne
Description:	Net calorific Value of furnace oil
Measured /Calculated /Default:	Default
Source of data:	Provided by the supplier
Value(s) of monitored parameter:	The monthly average values are provided in the ER calculation sheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-
Measuring/ Reading/ Recording frequency:	From the monthly fuel supplier's report
Calculation method (if applicable):	-
QA/QC procedures applied:	The project activity is being operated under internationally accepted ISO 9001 and ISO 14001 based quality and environmental management systems.

Data / Parameter:	EF_i
Data unit:	tC/TJ
Description:	Carbon emission factor for furnace oil
Measured /Calculated /Default:	Monitored
Source of data:	IPCC 2006 Guidelines Chapter 1
Value(s) of monitored parameter:	21.100
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable, these are latest IPCC values as available
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	-
QA/QC procedures applied:	The project activity is being operated under internationally accepted ISO 9001 and ISO 14001 based quality and environmental management systems.

Data / Parameter:	EG_{GEN}
Data unit:	MWh per year
Description:	Total Electricity Generated
Measured /Calculated /Default:	Measured
Source of data:	Power plant records
Value(s) of monitored	37,608.497

parameter:											
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations										
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p><u>Type:</u> Make: ALLEN BROADLY, Model: POWER MONITOR 3000 <u>Accuracy Class:</u> 0.5 <u>Calibration frequency:</u> Annual</p> <p>Dates of calibration and validity information are as provided in the table below:</p> <table border="1"> <thead> <tr> <th>Monitoring Equipment</th> <th>Serial Number</th> <th>Calibration Date</th> <th>Valid upto</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Energy Meter located at TG Control room (TG Incomer)</td> <td rowspan="2">Meter Identification No. 1404-M505A-DNT-UNIT ID 050</td> <td>14/10/2010</td> <td>13/10/2011</td> </tr> <tr> <td>14/10/2011</td> <td>13/10/2012</td> </tr> </tbody> </table>	Monitoring Equipment	Serial Number	Calibration Date	Valid upto	Energy Meter located at TG Control room (TG Incomer)	Meter Identification No. 1404-M505A-DNT-UNIT ID 050	14/10/2010	13/10/2011	14/10/2011	13/10/2012
Monitoring Equipment	Serial Number	Calibration Date	Valid upto								
Energy Meter located at TG Control room (TG Incomer)	Meter Identification No. 1404-M505A-DNT-UNIT ID 050	14/10/2010	13/10/2011								
		14/10/2011	13/10/2012								
Measuring/ Reading/ Recording frequency:	Measured continuously										
Calculation method (if applicable):	-										
QA/QC procedures applied:	The project activity is being operated under internationally accepted ISO 9001 and ISO 14001 based quality and environmental management systems.										

Data / Parameter:	EG_{AUX}										
Data unit:	MWh per year										
Description:	Auxiliary Electricity Consumption										
Measured /Calculated /Default:	Measured										
Source of data:	Power plant records										
Value(s) of monitored parameter:	3,256.127										
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations										
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>There are 4 meters in the project boundary for the measurement of auxiliary consumption (inclusive of Import). These meters and their relevant details are provided below:</p> <p>1. Energy meter located at TG Control Room (Auxiliary Transformer) – (A) Type: Make - BECK OFF; Model BK 7000 - 3φ 4wire Accuracy Class: 0.5 Calibration Frequency: Annual Serial Number and calibration details are provided below:</p> <table border="1"> <thead> <tr> <th>Monitoring Equipment</th> <th>Serial Number</th> <th>Calibration Date</th> <th>Valid upto</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Energy Meter located at TG Control room (TG Incomer)</td> <td rowspan="2">24040001</td> <td>14/10/2010</td> <td>13/10/2011</td> </tr> <tr> <td>14/10/2011</td> <td>13/10/2012</td> </tr> </tbody> </table> <p>2. Grid import metering point 1 - Incomer from CHTSS (PCC Panel) – (B) Type: Make - Make: L&T , Model: ACRUX Accuracy Class: 1.0</p>	Monitoring Equipment	Serial Number	Calibration Date	Valid upto	Energy Meter located at TG Control room (TG Incomer)	24040001	14/10/2010	13/10/2011	14/10/2011	13/10/2012
Monitoring Equipment	Serial Number	Calibration Date	Valid upto								
Energy Meter located at TG Control room (TG Incomer)	24040001	14/10/2010	13/10/2011								
		14/10/2011	13/10/2012								

Calibration Frequency: Annual
 Serial Number and calibration details are provided below:

Monitoring Equipment	Serial Number	Calibration Date	Valid upto
Grid import metering point 1 (B): Energy meter -Incomer from CHTSS (PCC Panel)	3715245	14/10/2010	13/10/2011
		14/10/2011	13/10/2012

3. Grid import metering point 2: Energy Meter located at TG Control room (Grid Incomer) (C)

Type: Make: ALLEN BROADLY, Model: POWERMONITOR 3000
 Accuracy Class: 0.5

Calibration Frequency: Annual

Serial Number and calibration details are provided below:

Monitoring Equipment	Serial Number	Calibration Date	Valid upto
Grid import metering point 2 (C): Energy Meter located at TG Control room (Grid Incomer)	1404-M505A-DNT-UNIT ID 049	14/10/2010	13/10/2011
		14/10/2011	13/10/2012

4. Energy meter located at incomer from 2MVA transformer (PCC Panel)

Type: Make: ALLEN BROADLY, Model: POWERMONITOR 3000
 Accuracy Class: 0.5

Calibration Frequency: Annual

Serial Number and calibration details are provided below:

Monitoring Equipment	Serial Number	Calibration Date	Valid upto
Energy meter located at incomer from 2MVA transformer (PCC Panel)	3704819	14/10/2010	13/10/2011
		14/10/2011	13/10/2012

During the monitoring period due to plant shutdown or less generation, power from grid was imported. This import of power from state grid has also been adjusted against generation to arrive at the net electricity supplied by project activity during the monitoring period.

With regard to Power Plant Auxiliary consumption, the readings are taken from the meter numbered 24040001 (and not from meter 3704819) in order to capture transformer losses also (which is the most conservative approach). It may be noted that there is **no addition of new meters within the project boundary.**

Measuring/ Reading/ Recording frequency:	Measured continuously
Calculation method (if applicable):	A+B+C (above)
QA/QC procedures applied:	The project activity is being operated under internationally accepted ISO 9001 and ISO 14001 based quality and environmental management systems.

Data / Parameter:	EG_y
Data unit:	MWh per year
Description:	Net Electricity supplied to KSL facility

Measured /Calculated /Default:	Calculated
Source of data:	Power plant records;
Value(s) of monitored parameter:	34,352.370
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	Power plant records; calculations shown in the ER calculation excel sheet
QA/QC procedures applied:	The project activity is being operated under internationally accepted ISO 9001 and ISO 14001 based quality and environmental management systems.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

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A combined margin approach has been used to calculate the baseline emissions for the southern region electricity grid (ex-ante estimations). The emission factor is calculated as follows:

$$BE_y = EG_y * EF_y$$

EF_y is combined margin emission factor for Southern Regional (SR) grid, fixed ex-ante (1.110 tCO₂/MWh)

Calculation of Net Electricity Generation (EG_y):

Monitoring Parameter	Value	Unit
Electricity generation during the monitoring period	37,608.497	MWh
<u>Sum of auxiliary consumption and grid power import:</u> Auxiliary consumption of Power Plant (EG _{AUX}) + import from grid during the monitoring period	3,256.127	MWh
Net electricity available for use/ grid electricity avoided (EG _y) during the monitoring period.	34,352.370	MWh

Baseline Emissions (BE_y)

$$\begin{aligned}
 BE_y &= EG_y * EF_y \\
 &= 34,352.370 * 1.110 \\
 &= 38,131.13 \text{ tCO}_2
 \end{aligned}$$

E.2. Project emissions calculation

>>

The project emissions are calculated for use of furnace oil as auxiliary fuel for generation start-up, 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:

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

The project emissions during the monitoring period are calculated as follows, and the detailed daily FO consumption figures are included in the emission reduction calculation excel.

Monitoring Parameter	Value	Unit	Data Source
Quantity of Furnace Oil (FO) used (Qi)	958.246	Tonnes	Power Plant Logs
Net Calorific Value of FO (NCVi)	presented as monthly values	kCal/kg	Please refer ER calculation sheet for monthly details of NCV
Energy content in furnace oil quantity Qi based on data provided by the supplier	37.9367	TJ	Based on fuel supplier data of calorific value and density
Carbon Emission Factor of FO (EFi)	21.100	tC/TJ	IPCC 2006 guidelines, Chapter 1
Oxidation Factor of FO (OXIDi),	1.000		IPCC 2006 guidelines, Chapter 1
Project Emission (PEy) due to FO burning	2,935.034	tCO ₂	Calculated

LPG is used in insignificant quantities in the project activity for emergency purposes only. During the monitoring period, the total LPG consumption was 57 kg (3 cylinders of 19 kg capacity each).

The project emissions due to LPG consumption are calculated as = $(57 * 10^{-6} \text{ kt}) * (17.2 \text{ tC/TJ}) * (44/12 \text{ tCO}_2/\text{tC}) * (47.31 \text{ TJ/kt}) * (0.995) = 0.169 \text{ tCO}_2$. The project emissions due to LPG consumption are insignificant and hence not been considered in emission reduction calculations – this is also in line with the registered PDD.

E.3. Leakage calculation

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No leakage is considered, as per adopted baseline methodology.

E.4. Emission reductions calculation / table

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The Emission Reduction is the difference between the Baseline Emission and the Project Emission during the Monitoring Period calculated as follows:

$$ER_y = BE_y - PE_y$$

Particulars	Units	Values
Baseline Emissions considered (BEy)	tCO ₂	38,131.13
Project Emission considered (PEy)	tCO ₂	2,935.034
Annual Emission Reductions Considered (ERy)	tCO ₂	35,196.10

The emission reductions for the period 01 January 2011 to 31 December 2011 is **35,196 tCO₂ (rounded down)**.

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO₂e)	62,958	35,196

E.6. Remarks on difference from estimated value in the PDD

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ER_{PDD}: 62,958 tCO₂e for the period 01 January 2011 to 31 December 2011

ER_{monitoring period}: 35,196 tCO₂e

ER_{PDD} > ER_{monitoring period}; there was no increase in the actual emission reductions achieved during the monitoring period compared to the registered CDM-PDD.

The emission reductions for the period 01 January 2011 to 31 December 2011 is 35,196 tCO₂. A difference in the emission reduction has been observed between the emission reduction estimated in the registered PDD and emission reduction calculated in the monitoring report. This was due to the fact that the steel plant was shut down for a considerable period and consequently the power plant was also shut down.

History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory Document Type: Guideline, Form Business Function: Issuance		