Monitoring report form

(Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT		
Title of the project activity	LMEL 25 MW Waste Heat based Captive Power Plant.	
UNFCCC reference number of the project activity	9003	
Version number of the monitoring report	0	
Completion date of the monitoring report	19/08/2016	
Monitoring period number and duration of this monitoring period	Monitoring period number : 2 Duration of this monitoring period:01/07/2014 to 30/06/2016	
Project participant(s)	M/s Lloyds Metals & Engineers Limited. (Now M/s Lloyds Metals and Energy Limited)	
Host Party	India (host) Ministry of Environment and Forest	
Sectoral scope(s)	Sectoral scope : 01& 04, EB 6	
Selected methodology(ies)	Approved Methodology : ACM 0012 Version 04.00 Sectoral scope : 01& 04, EB 60 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"	
Selected standardized baseline(s)	Not Applicable	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	222,096 tonnes of CO_2e	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	Not Applicable	126,283 tonnes of CO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>> A.1. Purpose and general description of project activity

a) Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks;

The purpose of the project activity is to achieve efficient use of waste heat from waste flue gases to generate electricity. The electricity so generated shall be used to meet the power requirement of Lloyds Metals and Engineers Limited (LMEL) sponge iron plant itself and balance will be supplied to Maharashtra State Electricity Distribution Company Limited (MSEDCL) grid to wheel the electricity to power trading company as per power purchase agreement signed for sell of up to 15MW of surplus power.

b) Brief description of the installed technology and equipment:

1) Waste Heat Recovery Boilers (WHRB):
A separate WHRB is provided for each kiln with specifications given below. There will be total 5 WHRBs as there are five kilns (4 numbers of 100 TPD and 1 number of 500 TPD).

PARAMETERS	WHRB Technical Data Values for each type of boiler	
Capacity tonnes/hr Max	12.7	58.4
Rated Capacity tonnes/hr	12	55
Steam pressure kg/cm2 a	70	70
Steam temperature deg c	490	490
Flue gas flow rate N m3/h	27000	120,000
Flue gas inlet temperature deg c	1000	1,000
Flue gas outlet temperature deg c	180	180
Boiler feed water temperature deg c	140	140
Sponge iron kiln number	4	1
No of boilers	4	1
Sponge iron kiln capacity TPD	100	500
Design Efficiency of boiler as per ERK data sheets	81.51%	82.8%
Manufacturer	Lloyds Steel Industries Ltd Engineering division	Lloyds Steel Industries Ltd Engineering division

2) Steam Turbine Generator: Project activity has set up one 30 MW steam turbine along with water cooled steam condenser and ejector system. Make of turbine: Qingdao Jieneng Power Station Engineering Co Limited, China which generate power at 11 KV.

3) Auxiliary Equipment: Auxiliary equipment to power plant comprise of one cooling tower with circulating water pumps, boiler feed water pumps and deaerator, all interconnecting piping with valves, control systems like DCS for all 5 WHRB boilers and one 90 TPH FBC boiler and power evacuation systems for connecting to grid at 220 KV level.

c) Relevant dates for the project activity:

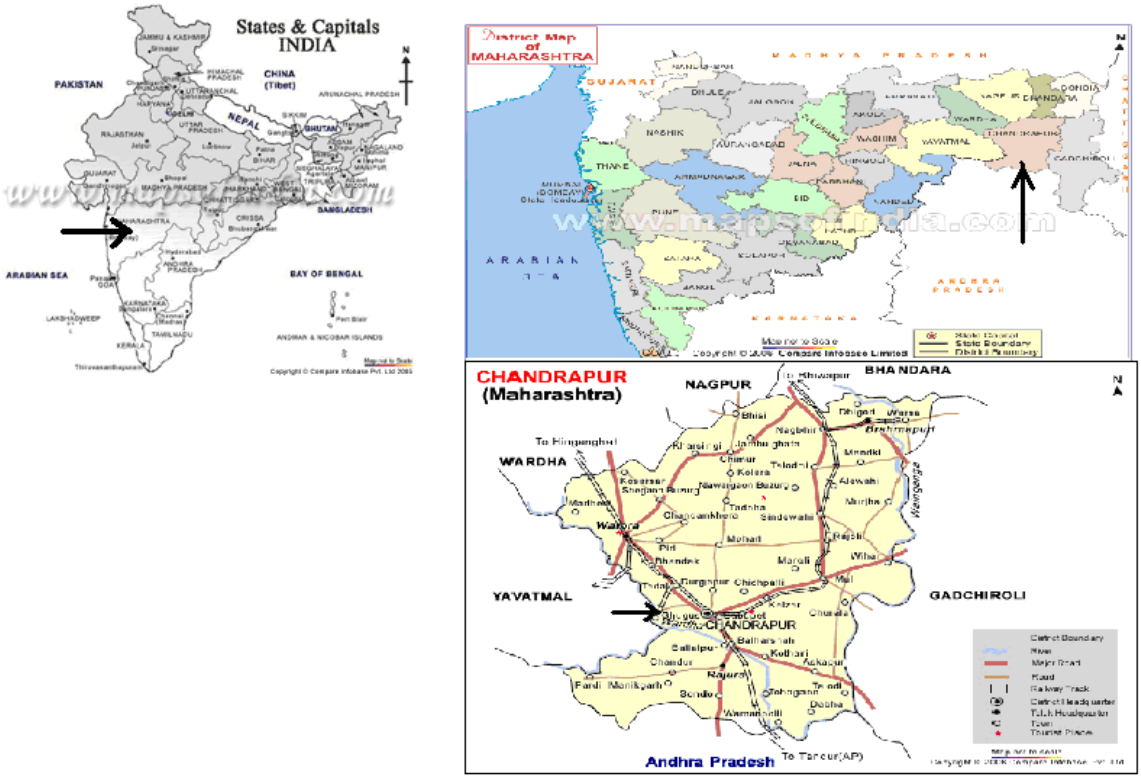
Activity completion of project activity	Date of completion	Evidence
Construction	19/11/2010	IBR provisional order of 19/11/2010 for boiler operation
Commissioning	18/12/2010	MSETCL letter of 18/12/2010 for injecting electricity
Continued operation of the power plant	28/12/2010	MPCB letter of 28/12/2010 "Consent to operate"

d) Total GHG emission reductions:

Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period: tonnes of CO_2e

A.2. Location of project activity

>> The project activity is located within the industrial facility of Lloyds Metals and Energy Limited is located at Plot No A 1-2. MIDC Area, village Ghugus about 25 KM from Chandrapur town and situated at Longitude 79^0 07' 15" E Latitude 19^0 56' 15" N. Nearest Railway station is Tadali.



A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
India (host) Ministry of Environment and Forest Party A (host)	M/sLloyds Metals & Engineers Limited. (Private entity) Name changed to M/sLloyds Metals & Energy Limited.	No

A.4. Reference of applied methodology and standardized baseline

>> Title of approved methodology: "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"

Methodology No &Version: ACM 0012, Version 04.0.0, Sectoral Scope: 1 & 4, EB 60

Tools ACM 0012 draws upon:

(1) "Tool for the demonstration and assessment of additionality (Version 06.0.0) EB 65
(2) "Tool to calculate the emission factor for an electricity system Version 2.2.1, EB 63
(3) "Tool to determine the baseline efficiency of thermal or electric Energy generation systems" Version 1 EB 48
(4) "Tool to determine the remaining lifetime of equipment" Version1 EB 50

"Tool to calculate project or leakage of CO_2 emissions from fossil Fuel combustion" Version 2 EB 41

A.5. Crediting period of project activity

>>

Type of the Project Activity	**Waste Heat based 25 MW Captive Power Plant**
Start date of the crediting period of the project activity	27/05/2013
Length of Crediting period of the project activity	10 years 0 months
Duration of this monitoring period	01/07/2014 to 30/06/2016
Length of this monitoring period	2 years 0 days

A.6. Contact information of responsible persons/entities

>> Responsible person for completing the CDM-MR-FORM. Lloyds Steel Industries Ltd engineering division is not a project proponent.

Mr R.M.Alegavi
Sr Vice President (Technology)
Lloyds Steel Industries
Engineering division of Uttam Value Steels Limited
16TH floor, Trade World,Kamala City
Lower Parel
Mumbai 400013
Tel No 91-22-30418111, 30418221 Fax No 91-22-30418260
rmalegavi@lloyds.in, rmalegavi@hotmail.com

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

>> **1) Implementation status**.

Activity completion of project activity	**Date of completion**	**Evidence**
Construction	19/11/2010	IBR provisional order of 19/11/2010 for boiler operation
Commissioning	18/12/2010	MSETCL letter of 18/12/2010 for injecting electricity
Continued operation of the power plant	28/12/2010	MPCB letter of 28/12/2010 "Consent to operate"

2) Description of the installed technology, technical process and equipment

Schematic for project boundary and parameters are provided as below.

The project activity is 25 MW waste heat recovery based power generation from waste flue gases which were initially treated in water scrubber in absence of project activity. The technical specification of Power Plant equipments installed in project facility is as follows.

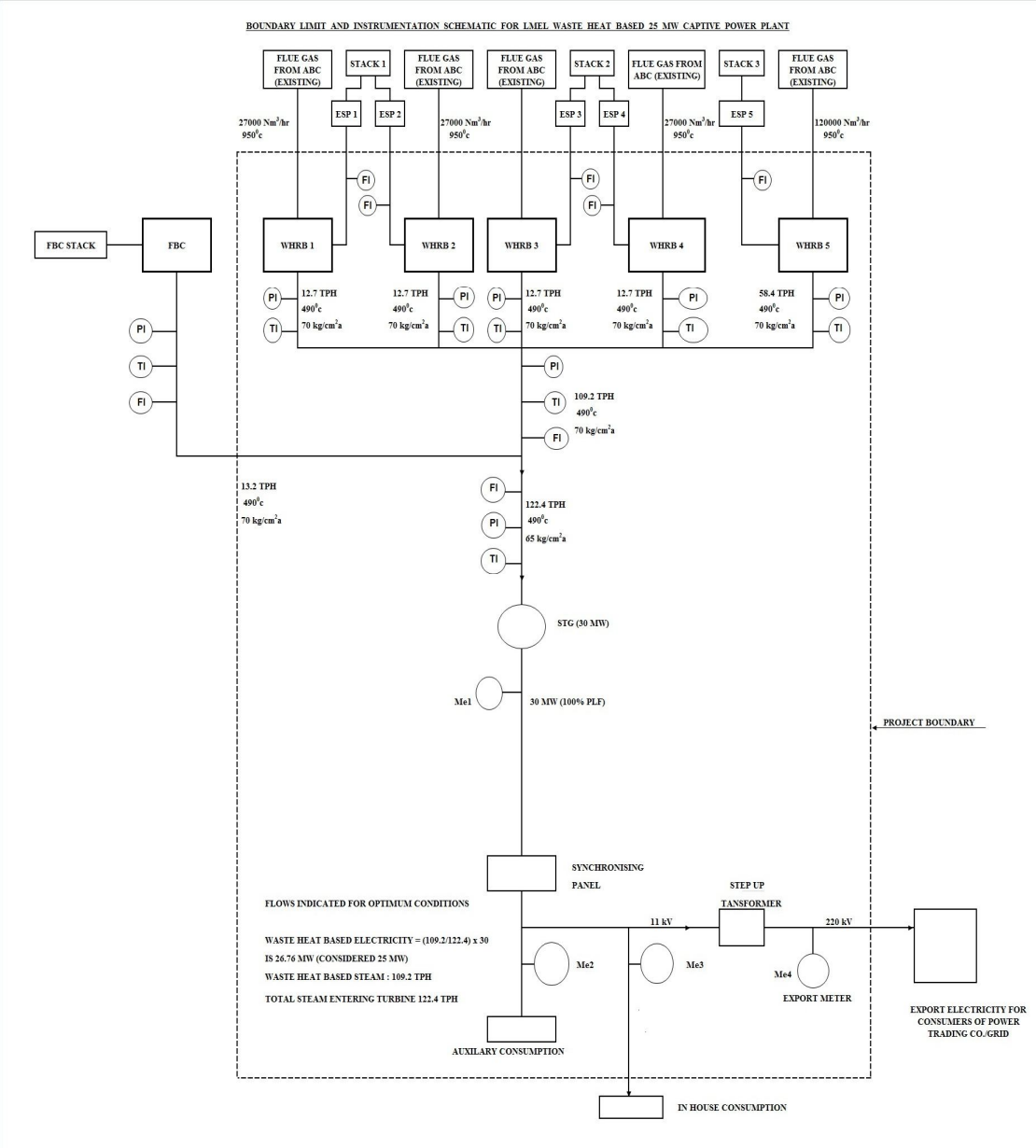
1) The Waste Heat Recovery Boilers (WHRB):
A separate WHRB is provided for each kiln with specifications given below. There will be total 5 WHRBs as there are five kilns (4 numbers of 100 TPD and 1 number of 500 TPD).

PARAMETERS	WHRB Technical Data Values for each type of boiler	
Capacity tonnes/hr Max	12.7	58.4
Rated Capacity tonnes/hr	12	55
Steam pressure kg/cm2 a	70	70
Steam temperature deg c	490	490
Flue gas flow rate N m3/h	27000	120,000
Flue gas inlet temperature deg c	1000	1,000
Flue gas outlet temperature deg c	180	180
Boiler feed water temperature deg c	140	140
Sponge iron kiln number	4	1
No of boilers	4	1
Sponge iron kiln capacity TPD	100	500
Design Efficiency of boiler as per ERK data sheets	81.51%	82.8%
Manufacturer	Lloyds Steel Industries Ltd Engineering division	Lloyds Steel Industries Ltd Engineering division

2) Steam Turbine Generator:
Project activity has set up one 30 MW steam turbine along with water cooled steam condenser and ejector system. Make of turbine: Qingdao Jieneng Power Station Engineering Co Limited, China which generate power at 11 KV.

3) Auxiliary Equipments:
Auxiliary equipment to power plant comprise of one cooling tower with circulating water pumps, boiler feed water pumps and deaerator, all interconnecting piping with valves, control systems like DCS for all 5 WHRB boilers and one 90 TPH FBC boiler and power evacuation systems for connecting to grid at 220 KV level.

TABLE 1: Single Line Diagram of the Project Activity



B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

>> No application for temporary deviation from registered monitoring plan and applied methodology has been done during this monitoring period.

B.2.2. Corrections

>> 1) No corrections to project information or parameters fixed at validation are being submitted along with this monitoring report

2) During the Monitoring Period 1 PDD was revised to include corrections and revised PDD version 11 is approved and available on UNFCCC site for project reference 9003 at the time of first issuance on 29/03/2016 .

B.2.3. Changes to start date of crediting period

>> 1) No application for changes to the design of project activity has been done during this monitoring period.

2) During the Monitoring Period 1 PDD was revised to include corrections and revised PDD version 11 is approved and available on UNFCCC site for project reference 9003 at the time of first issuance on 29/03/2016

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

>> Monitoring plan has been included in registered PDD.

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

>> 1) No application for permanent changes from the registering monitoring plan, applied methodologies or applied base line have been submitted during this monitoring report

2)) During the Monitoring Period 1 PDD was revised to include corrections and revised PDD version 11 is approved and available on UNFCCC site for project reference 9003 at the time of first issuance on 29/03/2016

B.2.6. Changes to project design of registered project activity

>> No application for changes to the project design of the project activity has been done during this monitoring period

B.2.7. Types of changes specific to afforestation or reforestation project activity

>>
Not applicable as the project activity is not afforestation or reforestation project activity.

SECTION C. Description of monitoring system

>> **(A) Purpose**

To define the procedures and responsibilities for GHG Performance, monitoring, measurement and reporting of data and dealing with uncertainties and covers the responsibilities regarding plant operation and maintenance.

(B) Scope

This procedure is applicable to waste heat based WHRB power project of LMEL.

(C) Responsibilities for measurements.

We define below the responsibilities of the professionals involved in running the project activity.

Shift Engineer (Operations): Responsible for proper operation of the mechanical equipment and reporting hourly and eight hourly data and measurements of steam generated from WHRB, steam fed to turbines, parameters of steam and waste gas flow meters. The report is then sent to the Plant Manager for his review.

Shift Engineer (Electrical): Responsible for proper operation of electrical equipment and taking meter reading /measurement for electricity generation and export. The report is then sent to the Plant Manager for his review on a daily basis.

Shift Engineer (Maintenance): Responsible for proper maintenance management. The report is then sent to the Manager (plant) for his review on a daily basis.

Manager (Plant): Responsible for operation, maintenance and management of plant and calibration of monitoring equipments. He will be reviewing the monitored parameters/measurements shift-wise and presenting a daily executive summary report, duly signed by himself, to the General Manager (Plant)/Vice President.

General Manager /Vice President: Responsible and in charge of complete operation, maintenance and management of all plant and CDM related matters. He is in-charge of all CDM related matters and CDM officer directly reports to him.

CDM officer: He reports to General Manager and responsible for preparing required documentation and reviewing the accuracy of various reports with counter checks along with project developer. He is responsible for internal audit and archiving of data every month regarding CDM project matter.

Monitoring System

The following parameters are monitored:

- Gross generation of electricity by the power plant
- Auxiliary consumption.
- Steam availability from WHRB boilers/other boiler
- Steam flow entering to STG.
- Temperature and pressure of steam entering STG.
- Net electricity generation from waste heat recovery.
- Energy content of WHRB steam and other steam
- Waste gas quantity
- Exported electricity
- In house electricity consumption
- Fraction of electricity exported to third party for sale

Plant operation and maintenance: Plant manager will be responsible for total plant operation and maintenance of all project equipment and monitoring equipment

Metering system

The metering system for the waste heat based power plant shall consist of

- In house metering system of LMEL (for metering the generation of power, auxiliary consumption, In-house consumption and LMEL meters to monitor the export of power to third party)
- Export electricity meters of MSEDCL grid.
- Flow meters for monitoring steam flow from WHRBS/other boilers
- Flow meter for steam inlet to turbine.
- Flow meters on waste gas duct.
- Steam Temperature gauge for WHRB boiler/other boiler outlets and at inlet of TG
- Steam Pressure gauge for WHRB boiler/other boiler and at inlet of TG

Calibration

All the metering devices shall be calibrated once every year so that the accuracy of measurement is ensured.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

(Copy this table for each piece of data and parameter)

Data/parameter:	$EF_{Elec\ i,j,y}$
Unit	tCO_2/MWh
Description	The CO_2 Emission factor for the grid displaced due to project activity, during year y.
Source of data	CEA CO_2 baseline database version 4.0, Oct 2008.
Value(s) applied)	0.8032
Choice of data or measurement methods and procedures	Government of India, Ministry of Power, and Central Electricity Authority have issued "CO2 Baseline Database for the Indian Power Sector' User Guide Version 7.0 Jan 2012. This document along with CO2 Database excel calculations are available on web site http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm The document follows "Tool to calculate the emission factor for an electricity system" Version 2.2.1, EB 63 to calculate emission factors for electricity grids in India.
Purpose of data	For calculating baseline emissions.
Additional comments	Calculated value for $EF_{Elec\ y}$ =0.8032 tCO_2/MWh is fixed Ex-ante for entire credit period.

Data/parameter:	$Q_{WCM,BL}$
Unit	Nm^3/ year
Description	Average quantity of WECM i.e. waste gas released in atmosphere in three years prior to start of the project activity.
Source of data	Actual production data of LMEL facility
Value(s) applied)	1,067,921,600
Choice of data or measurement methods and procedures	The quantity of WECM i.e. waste gas is calculated by multiplying the actual production data of sponge iron production by LMEL per year (tonnes) and multiplying it with WECM generated per unit of product in (Nm^3/tonne). The specific WECM generation per unit of product is based on manufacture's supplied data as per operational manual. For 1 x 500 TPD, Specific WECM generation per unit of product = 5,280 Nm^3/tonne. For 4 x 100 TPD, Specific WECM generation per unit of product = 6,240 Nm3/tonne
Purpose of data	For calculation of baseline cap f_{cap} used in calculating baseline emissions.
Additional comments	

Data/parameter:	$Q_{BL,product}$
Unit	tonnes/year
Description	Production of Sponge Iron in industrial facility
Source of data	Actual production data of industrial facility of LMEL sponge iron plant.
Value(s) applied)	185,493

Choice of data or measurement methods and procedures	Actual sponge iron production data of LMEL for three years prior to project start date (Start date- 15/03/2007) 1) Sponge Iron production data considered from 01/04/2004 up to 31/03/2007 for 1 x 500 TPD Kiln. Average of three year production data is considered to arrive at annual average sponge iron production. The annual average production figure for 1x500 TPD kiln is 93,288 Tonnes/yr. 2) Other 4 x 100 TPD kilns start full operation from April 2006. Therefore sponge iron production data for 4x100 TPD kilns taken from April-2006 to March-2007. Data is selected for one year only as operational history of all four 100 TPD kilns is less than three years. The annual average production figure for 4x100 TPD kiln is 92,205 Tonnes/yr.
Purpose of data	For baseline
Additional comments	Nil

Data/parameter:	$q_{wcm,product}$
Unit	Nm^3/tonne
Description	Specific waste energy production per tonne of sponge iron manufactured.
Source of data	Manufacturer's data on waste gas generation for each type of sponge iron kiln.
Value(s) applied)	1) For 4x100 TPD kiln – 6240 Nm^3/tonne 2) For 500 TPD kiln 5280 Nm^3/tonne
Choice of data or measurement methods and procedures	Prior to the start date of project i.e. 15/03/2007, flue gases were not monitored before letting into the atmosphere. Hence sponge iron kiln manufacturers operating manual data for generation of flue gas per hour is used for calculating the flue gas per tonne.
Purpose of data	For baseline
Additional comments	Nil

Data/parameter:	$d_{wcm,BL}$
Unit	Kg/Nm^3
Description	Density of WECM i.e. waste flue gases
Source of data	Process data sheets for waste heat recovery boilers at LMEL by process design licensor M/s ERK Eckrokessel GmbH.
Value(s) applied)	1.335 kg/Nm^3 for WECM from 100TPD kiln and 1.3649 kg/Nm^3 for WECM from 500 TPD kiln.
Choice of data or measurement methods and procedures	Densities for waste flue gases at normal conditions were provided by licensor M/s ERK Eckrokessel GnbH to boiler manufacturer (i.e. M/s Llyods Steel Industries Ltd) based on the composition of flue gases from each type of kiln.
Purpose of data	For calculating mass flow rate of waste gas used in calculating baseline emissions.
Additional comments	

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter)

Data/parameter:	$Q_{WCM,y}$
Unit	kgs/year
Description	Quantity of waste gas used to generate electricity during the year y

Measured/calculated/default	Calculated
Source of data	Individual WHR boiler log book records for each kiln mentioning the waste gas generation quantity in Nm^3.
Value(s) of monitored parameter	1,279,549,362.2kgs(947,825,300 Nm3) for 01/07/2014 to 30/06/2015 and 1,295,381,058 kgs (959,281,100 Nm3) for 01/07/2015 to 30/06/2016 2,574,930,420 kgs (1,907,106,400 Nm3) for monitoring period.
Monitoring equipment	The monitoring point is after the boiler's ESP as no meter is suitable for metering the high temperatures waste flue gases at temperatures of 950 deg c before boiler inlet. Therefore the metering is done after the WHR boiler exit at 140 deg centigrade. The flow meter is calibrated according to temperature and pressure of WECM. Type of meter: Ultrasonic Make: GE Sensing Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 2.0% as provided by GE Specifications
Measuring/reading/recording frequency:	The difference between end reading and start reading of the day is taken to arrive at the day's flow of flue gas. The total quantity per year is calculated using daily record.
Calculation method (if applicable):	Mass of waste gas is calculated by multiplying the Nm^3 quantity of gas with density at NTP conditions. Density of waste gas at NTP conditions is provided in section D.2 under parameter "$d_{wcm,BL}$" above
QA/QC procedures:	Meters are calibrated once every year to maintain the required accuracy in data measurement.
Purpose of data:	For calculation of baseline cap f_{cap} used in calculating baseline emissions
Additional comments:	Data will be archived for 12 years

Data/parameter:	$EG_{i,j,y}$
Unit	MWh/yr
Description	Quantity of electricity supplied to the recipient plants by generator which in the absence of project activity would have been sourced from grid during the year
Measured/calculated/default	The quantity of electricity supplied to the recipient facility is calculated from metered values of gross electricity generation minus auxiliary consumption of power plant. i.e. $EG_{gross} - EG_{Auxiliary}$
Source of data	1) Recipient plants records maintained in log book (i.e. LMEL and Power trading company receiving the surplus electricity from project activity) and 2) Generation plant i.e. LMEL measurement records as maintained in log book.
Value(s) of monitored parameter	323,289.01 MWh for monitoring period (145,537.23 for 2014-15 +177,751.78 for 2015-16)

Monitoring equipment	Energy Meters Meter details: Me1 - Generator end, Type- E3-M Premier, Make-SEMS Me2 - Auxiliary consumption meter (4 numbers), Type-Alpha M++, Make: Elster Me4 - Export meter, Type – Alpha M++, Make: Elster Me3 - In house LMEL consumption meter, Type-Alpha M++, Make: Elster
Measuring/reading/recording frequency:	Log book of hourly reading is signed by plant manager daily. The difference between end reading and start reading of the day is taken to arrive at the day's energy generation and export data. The meters reading is available on DCS continuously or DMRI data from Energy meter is uploaded to Elster's (ABB) Pearl Reporting Software and report is generated and same is transferred to log book to be maintained by shift engineer, approved by shift in charge daily.
Calculation method (if applicable):	Power plant has been provided with four meters for metering the auxiliary consumption and one meter for metering the gross energy generation. The location of meters is provided in project boundary diagram in section B.3 of PDD. 1) Gross generation "EG_{gross}" is metered by "Me1" 2) Auxiliary consumption "$EG_{Auxilary}$" is metered by "Me2" which is sum of readings of "Me2A", "Me2B", "Me2C", "Me2D" sub-meters. The meter "Me2C" is not installed on the site but will be installed later according to the auxiliary load requirement. This calculation is cross checked by sum of export electricity metered by energy meter "Me4" and in house consumption electricity meter "Me3 A/B" which is sum of Me3Aand Me3B.. The in house consumption of LMEL is supplied through two transformers out of which one is standby. The transformer with Me3 A meter is on line normally. The standby transformer is also charged with Me3 B meter. The stand by transformer is not taken on line unless required. Occasionally it is possible that both transformers have to be taken on line to meet demand of the electricity consumption of recipient LMEL and Me3B readings will then be taken continuously. Thus there are two meters to record electricity consumption of LMEL and Me3 is taken as sum of Me3A and Me3B.Normally Me3B reading is zero. The difference of "Me1" and "Me2" was recorded to be 323,289.01 MWh whereas the sum of "Me3" and "Me4" was recorded as 319,309.69 MWh for the monitoring period. Since the sum of "Me3" and "Me4" meter were found to be more conservative, therefore the same was considered for the emission reduction calculation. Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 0.2%
QA/QC procedures:	Quality control of monitored data from energy meters is ensured as the meters undergo calibration once every year. The annual calibration certificates are submitted to the verification team.
Purpose of data:	For calculating $EG_{j,y}$ used in calculation of base line emissions
Additional comments:	Data will be archived for 12 years

Data/parameter:	$EG_{j, y}$
Unit	MWh
Description	Quantity of electricity supplied to recipient facilities (i.e. LMEL and Power Trading Company) by the project activity during the year y
Measured/calculated/default	Calculated.
Source of data	Recipient plants records maintained in log book at LMEL facility (i.e. LMEL and Power trading company receiving the surplus electricity from project activity)
Value(s) of monitored parameter	157,225.138 MWh for monitoring period (74853.906 for 2014-15 + 82371.232 for 1015-16)
Monitoring equipment	Not applicable
Measuring/reading/recording frequency:	Log book of hourly reading is signed by plant manager daily. The difference between end reading and start reading of the day is taken to arrive at the day's to arrive at the day's energy. The records and monitoring procedure will be same as stated in "EGi,j,y" above.
Calculation method (if applicable):	Calculated by using the following formula $EG_{j,y} = f_{WCM} * EG_{i,j,y}$ where $f_{WCM} = ST_{whr,y} / (ST_{whr,y} + ST_{other,y})$ $ST_{whr,y}$ = energy content of the steam generated by WHRB fed into turbine via common steam header $ST_{other,y}$ = energy content of the steam generated by other boiler FBCB fed into turbine via common steam header
QA/QC procedures:	Quality control of monitored data from energy meters is ensured as the meters undergo calibration once every year. The annual calibration certificates are submitted to the verification team.
Purpose of data:	For calculating base line emissions
Additional comments:	Data will be archived for 12 years

Data/parameter:	$EG_{export,y}$
Unit	MWh
Description	Quantity of electricity supplied to the recipient plants by generator which in the absence of project activity would have been sourced from grid during the year y
Measured/calculated/default	Measured
Source of data	Recipient plants records maintained in log book at LMEL facility (i.e. LMEL and Power trading company receiving the surplus electricity from project activity)
Value(s) of monitored parameter	323,289.01 MWh for monitoring period (145,537.23 for 2014-15 +177,751.78 for 2015-16)

Monitoring equipment	Internal captive consumption of LMEL is metered via meter "Me3". Surplus export of power is exported to power trading company and metered via meter "Me4". Export meter Me4 is official MSEDCL meter used for billing installed in plant premises. Meter details: Me4 - Export meter, Type- Alpha M++, Make : Elster Accuracy of Meter : 0.2%
Measuring/reading/recording frequency:	Log book of hourly reading is signed by plant manager daily. The difference between end reading and start reading of the day is taken to arrive at the day's energy. The meters reading are available on DCS continuously and same are transferred to log book to be maintained by shift engineer, approved by shift in charge daily.
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Quality control of monitored data from energy meters is ensured as the meters undergo calibration once every year.
Purpose of data:	To cross check $EG_{i,j,y\ y}$ used in calculation of base line emissions
Additional comments:	Data will be archived for 12 years

Data/parameter:	$Q_{whr\ Steam}$
Unit	tonnes/hr
Description	Quantity of steam from WHRB used for electricity generation.
Measured/calculated/default	Calculated
Source of data	LMEL Plant WHR boilers log book records for 5 WHR boilers on 4x100 TPD and 1x500 TPD kilns
Value(s) of monitored parameter	763,670.34 tonnes for monitoring period(380,604.9 for 2014-15 + 383,065.44 for 2015-16)
Monitoring equipment	Quantity of steam generation from all WHR boilers are individually monitored by electronic steam flow meters. Instrument type: Smart Transmitter with out put 4-20 MA analogue signal going to DCS. Make: Yokogwa Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 0.075% as provided by supplier
Measuring/reading/recording frequency:	Log book of hourly reading is signed by plant manager daily. The difference between end reading and start reading of the day is taken as the day's generation of steam. The log book total can be cross checked with totalised data provided in the instrument.
Calculation method (if applicable):	The steam flow meters installed at each WHRB provide measurement in mass units i.e. tonnes/h. Sum of each meter reading is done to arrive at value.
QA/QC procedures:	Calibration of meter is carried out once a year. QA/QC of monitoring equipment is maintained.
Purpose of data:	To calculate "f_{WCM}" used in calculating baseline emissions.
Additional comments:	Data will be archived for 12 years

Data/parameter:	$Q_{Other\ Steam(FBC\ Steam)}$
Unit	Tonnes/hr
Description	Quantity of steam from other boilers used for electricity generation.
Measured/calculated/default	Measured.
Source of data	LMEL Plant 90 TPH FBC boilers log book records.
Value(s) of monitored parameter	802,963.95 tonnes for monitoring period (359,399 for 2014-15 +443,564.95 for 2015-16)
Monitoring equipment	Quantity of steam generation from FBC boiler is monitored by electronic steam flow meters. Instrument type: Smart Transmitter with out put 4-20 MA analogue signal going to DCS. Make: Yokogwa Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 0.075% as provided by supplier
Measuring/reading/recording frequency:	Log book of hourly reading is signed by plant manager daily. The difference between end reading and start reading of the day is taken as the day's generation of steam. The log book total can be cross checked with totalised data provided in the instrument.
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Calibration of meter is carried out once a year. QA/QC of monitoring equipment is maintained.
Purpose of data:	To calculate f_{WCM}" used in calculating baseline emissions.
Additional comments:	Data will be archived for 12 years

Data/parameter:	$ST_{whr,y}$
Unit	TJ
Description	Energy content of Steam generated by WHRBs fed to turbine via common steam header
Measured/calculated/default	Calculated.
Source of data	$Q_{whr\ Steam}$ *from log books* as described above Steam and feed water enthalpy will be taken from steam tables from the link http://www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp .
Value(s) of monitored parameter	2173.193 TJ for monitoring period(1083.407 TJ for 2014-15 + 1089.786 for 2015-16)
Monitoring equipment	Not Applicable.
Measuring/reading/recording frequency:	Daily/hourly

Calculation method (if applicable):	Enthalpy of steam fed to turbine from the WHR boilers is calculated by taking the difference of enthalpy of steam and enthalpy of feed water. Enthalpy of steam from WHR boiler is taken at average steam pressure and temperature and of the day. Also feed water enthalpy at average feed water temperature of the day and is taken from steam tables from the link http://www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp $ST_{whr,y} = Q_{whr\ Steam}$ (Enthalpy of steam from WHR boiler is taken at average steam pressure and temperature and of the day- feed water enthalpy at average feed water temperature of the day)
QA/QC procedures:	Not applicable.
Purpose of data:	To calculate "f_{WCM}" used in calculating baseline emissions.
Additional comments:	Data will be archived for 12 years

Data/parameter:	$ST_{other,y}$
Unit	TJ
Description	Energy content of Steam generated by FBC fed to turbine via common steam header
Measured/calculated/default	Calculated.
Source of data	$Q_{Other\ Steam(FBC\ Steam)}$ *from log books* as described above Steam and feed water enthalpy will be taken from steam tables from the link http://www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp .
Value(s) of monitored parameter	2,284.9459 TJ for monitoring period(1023.0439 TJ for 2014-15 + 1261.902 for 2015-16)
Monitoring equipment	Not Applicable.
Measuring/reading/recording frequency:	Daily/hourly
Calculation method (if applicable):	Enthalpy of steam fed to turbine from the WHR boilers is calculated by taking the difference of enthalpy of steam and enthalpy of feed water. Enthalpy of steam from WHR boiler is taken at average steam pressure and temperature and of the day. Also feed water enthalpy at average feed water temperature of the day and is taken from steam tables from the link http://www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp $ST_{whr,y} = Q_{whr\ Steam}$ (Enthalpy of steam from WHR boiler will be taken ataverage steam pressure and temperature and of the day- feed water enthalpy at average feed water temperature of the day)
QA/QC procedures:	Not applicable.
Purpose of data:	To calculate f_{WCM}" used in calculating baseline emissions.
Additional comments:	Data will be archived for 12 years

Data/parameter:	$t_{whrsteam}$ / $t_{othersteam}$
Unit	Deg C
Description	Steam temperature at inlet to Steam turbine generator.
Measured/calculated/default	Measured
Source of data	LMEL Plant Records
Value(s) of monitored parameter	479.65□ C for 2014-15, 475.60□ C for 2015-16
Monitoring equipment	Direct measurement. Instrument type: Smart Transmtter with out put 4-20 MA analogue signal going to DCS. Make: ABB Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 0.075% as provided by supplier
Measuring/reading/recording frequency:	Daily/hourly
Calculation method (if applicable):	The temperature of steam from each WHRB is recorded on hourly basis and the average value is reported in the daily log sheets. The monthly average value is calculated from the daily average value. The annual average temperature (calculated from monthly average) is reported in the ER sheet and MR.
QA/QC procedures:	Calibration of transmitter is carried out once a year. QA/QC of monitoring equipment is maintained.
Purpose of data:	To calculate $ST_{whr,y}$ $ST_{whr,y}$ used to calculate f_{WCM}" used in calculating baseline emissions
Additional comments:	Data used for referring steam table for calculating steam enthalpy. Records will be maintained for 12 years as per CDM requirement.

Data/parameter:	$P_{whr\ steam}$/ $P_{other\ steam}$
Unit	Kg/cm^2 abs
Description	Steam pressure at inlet to STG
Measured/calculated/default	Measured
Source of data	LMEL Plant Records.
Value(s) of monitored parameter	63.56 kg/cm^2 abs for 2014-15, 64.22 kg/cm^2 abs for 2015-16
Monitoring equipment	Direct measurement. Instrument type: Smart Transmtter with out put 4-20 MA analogue signal going to DCS. Make: Yokogwa Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 0.075% as provided by supplier .
Measuring/reading/recording frequency:	Daily/hourly
Calculation method (if applicable):	The pressure of steam from each WHRB is recorded on hourly basis and the average value is reported in the daily log sheets. The monthly average value is calculated from the daily average value. The annual average pressure (calculated from monthly average) is reported in the ER sheet and MR.

QA/QC procedures:	Calibration of transmitter is carried out once a year. QA/QC of monitoring equipment is maintained
Purpose of data:	To calculate $ST_{whr,y}$ $ST_{whr,y}$ used to calculate f_{WCM}" used in calculating baseline emissions
Additional comments:	Data used for referring steam table for calculating steam enthalpy. Records will be maintained for 12 years as per CDM requirement.

Data/parameter:	T_{BFW}
Unit	Deg C
Description	Boiler feed water temperature at all boilers.
Measured/calculated/default	.measured
Source of data	LMEL Plant Records
Value(s) of monitored parameter	123.63□ C for 2014-15, 121.49□ C for 2015-16
Monitoring equipment	Direct measurement. Instrument type: Smart Transmtter with output 4-20 MA analogue signal going to DCS. Make: ABB Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 0.075% as provided by supplier
Measuring/reading/recording frequency:	Daily/hourly
Calculation method (if applicable):	The temperature of feed-water at inlet to WHRBs is recorded on hourly basis and the average value is reported in the daily log sheets. The monthly average value is calculated from the daily average value. The annual average temperature (calculated from monthly average) is reported in the ER sheet and MR.
QA/QC procedures:	Calibration of transmitter is carried out once a year. QA/QC of monitoring equipment is maintained.
Purpose of data:	To calculate $ST_{whr,y}$ $ST_{whr,y}$ used to calculate f_{WCM}" used in calculating baseline emissions
Additional comments:	Data used for referring steam table for calculating steam enthalpy. Records will be maintained for 12 years as per CDM requirement.

Data/parameter:	$t_{wcm,h}$
Unit	Deg C
Description	WECM(Flue gas) temperature at WHR boilers inlet.
Measured/calculated/default	Measured
Source of data	LMEL Plant Records
Value(s) of monitored parameter	819.73 deg C for 2014-15 and 811.90 deg C for 2015-16

Monitoring equipment	Direct measurement. Instrument type: Smart Transmtter with output 4-20 MA analogue signal going to DCS. Make: ABB Frequency of data measurement : On continuous basis Recording frequency : On hourly basis in logbook Responsible Person for recording data: Shift Engineer- operations Accuracy : +/- 0.075% as provided by supplier
Measuring/reading/recording frequency:	Daily/hourly
Calculation method (if applicable):	The temperature of flue gas at inlet to WHRBs is recorded on hourly basis and the average value is reported in the daily log sheets. The monthly average value is calculated from the daily average value. The annual average temperature (calculated from monthly average) is reported in the ER sheet and MR.
QA/QC procedures:	Calibration of transmitter is carried out once a year. QA/QC of monitoring equipment will be maintained.
Purpose of data:	As information only.
Additional comments:	Not used in any calculation.

Data/parameter:	Fj,y
Unit	%
Description	Fraction of total electricity generated by the project activity that is supplied to the recipients
Measured/calculated/default	Recipient plants records maintained in log book (i.e. LMEL and Power trading company receiving the surplus electricity from project activity)
Source of data	1) For LMEL facility = 9.59% 2) Export to Power Trading Company = 90.41%
Value(s) of monitored parameter	Net electricity supplied = 323,289.01 MWh Supplied to LMEL = 31,014.75 MWh Supplied to grid/Power trading = 292,274.34 MWh
Monitoring equipment	Sale records and purchase receipts will be used to ensure consistency.
Measuring/reading/recording frequency:	Data is measured and cross checked at the recipient plants and at generation plant. Records will be maintained for 12 years as per CDM requirement.
Calculation method (if applicable):	Calculated as percentage of net generation of the project activity For calculating $F_{LMEL,y}$, the electricity supplied to recipient facility LMEL is calculated is divided by the total electricity supplied to LMEL facility and the power trading company. Similarly, for calculating the fraction transferred to Power Trading Company, electricity supplied to grid is divided by the total electricity supplied to both the recipient facility.
QA/QC procedures:	Not applicable
Purpose of data:	For information only.
Additional comments:	Not used in any calculation.

D.3. Implementation of sampling plan

>> Not applicable as sampling approach is not followed.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>> **Ex-ante Calculation of Baseline Emissions:**

To calculate the baseline emissions equation no. 3 as stated in section B.6.1 above is followed. The baseline emissions are due to electricity displaced by the project activity in NEWNE grid. The baseline emissions for the year y i.e. "$BE_{Elec,y}$" are determined as follows.

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_{j} \sum_{i} (EG_{i,j,y} * EF_{Elec,i,j,y})$$

Calculation of each of the component of above formulae is provided below.

Calculation of Baseline cap " f_{cap}" using equation 38 of ACM 0012 Version 4

$$f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}}$$

$Q_{WCM,BL}$ = Quantity of waste gas generated prior to start of the project activity,Nm3
$Q_{WCM,y}$ = Quantity of waste used for energy generation during the year,Nm3

Calculation of fraction of total electricity generated by the project activity using waste energy " f_{wcm}":

Calculation of fraction "f_{WCM}" as per equation 39 of ACM0012 version 4 to calculate electricity supplied by waste heat is as below.

$$f_{WCM} = \frac{ST_{whr,y}}{ST_{whr,y} + ST_{other,y}}$$

(Equation no. 39 as per methodology)

Where,

$ST_{whr,y}$ = energy content of the steam generated by WHRB fed into turbine via common steam header

$ST_{other,y}$ = energy content of the steam generated by other boilers fed into turbine via common steam header

Following table provide the calculation of ***"fwcm"***. All the steam enthalpy data is taken from following web link having the standard steam table.

http://www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp

Enthalpy of feed water is taken from following web link.
http://www.spiraxsarco.com/resources/steam-tables/sub-saturated-water.asp

Emission Reductions

Emission reductions for the project activity are calculated by using the equations no. 42 of the methodology which is as stated below

$$ER_y = BE_y - PE_y$$

Where

ER_y = Total emission reductions tonnes/year

BEy= $BE_{Elec,y}$ i.e. Baseline emissions for the project activity during the year y

PE_y =0

Data sourcing and calculation procedures

The data is sourced from DMRI and SCADA. DMRI generates excel sheets for energy meter readings through pearl software and SCADA provides excel sheets of production log sheet of the day. We are enclosing here with DCS generated SCADA report and DMRI excel sheets for the Monitoring period. The data taken for calculation are sourced from these reports.. So there will be consistency in data. 2013July month in consistency is explained above.

The readings from DCS are recorded in log book every hour. However the totaliser reading difference between start of the day and end of the day are taken for calculating the following

- WHRB steam generation
- FBC steam generation
- Flue gas flow
- auxiliary consumption Me2A/B/D
- LMEL consumption Me3A/B
- Export of electricity to grid Me4

Pressure ,temperature of steam and boiler feed water are continuously monitored and hourly readings are note in the log book. The average temperature of the day for steam and boiler feed water is considered for calculations.

Enthalpy for steam and Water at recorded Av. temperature and Av. pressure are taken from Steam table Link http://www.spiraxsarco.com/resources/steam-tables/sub-saturated-water.asp

Energy content is calculated on daily basis from enthalpies of steam / water based on average of hourly readings of Steam / water temperature , pressure and quantity of steam using equations provided in registered PDD in line with ACM 0012 Version 4..The average reading of pressure and temperature is calculated based on hourly readings. Based on average daily readings the monthly average readings. Yearly average pressure and temperature are calculated by averaging monthly average reading. For yearly emission reduction calculations the energy content in steam and water are calculated using yearly average pressure and temperature of steam and boiler feed water as above. The quantity of steam of the day is calculated by taking totaliser readings of the meter at start and end of the day. Monthly steam generation is sum of daily readings. The quantity of steam generated in a year is calculated by adding monthly sums.

Similarly the electricity generation is calculated by taking totaliser readings of the meters at start of the day and end of the day. Monthly electricity generation is sum of daily generation. Yearly generation is sum of monthly generation.

Similar procedure is followed for auxiliary consumption also.

Similar procedure as described for steam and water is followed for flue gas quatity in the year calculations.

As sample calculation we give below for the values calculated for the monitoring period.

S.No	Parameter	Value for the period from 01/07/2014 to 30/6/2015	Value for the period from 01/07/2015 30/6/2016
1	Average steam pressure kg/cm2	63.56	64.22
2	Average steam temperature C	479.65	475.60
3	Average Boiler feed water temperature C	123.63	121.49
4	Enthalphy of steam at average pressure and temperature TJ/tonne	0.003371	0.003360
5	Enthalphy of BF water at average pressure and temperature TJ/tonne	0.000524	0.000515
6	Enthalphy provided in boiler TJ/tonne	0.002847	0.002845
7	WHRB steam generated in the year $Q_{whr\ Steam}$ *Tonnes*	*380,604.9*	*383,065.44*
8	FBC steam generated in the year $Q_{other\ Steam}$ *Tonnes*	*359,399.00*	*443,564.95*
9	Enegy content in WHRB steam $ST_{whr,y}$ TJ	*380,604.9* *x*0.002847 = 1083.407	*383,065.44* *x* 0.002845 =1089.786

10	Energy content in FBC steam $ST_{other,y}$ TJ	*359,399 X*0.002847 =1023.0439 TJ	*443,564.95 x*0.002845 =1261.902
11	Calculation of fraction $f_{WCM} = \frac{ST_{whr,y}}{ST_{whr,y} + ST_{other,y}}$	= 0.514328	=0.463406
12	Quantity of electricity supplied to recipient plants $EG_{i,j,y}$ *MWh*	*145,537.23*	*177,751.78*
13	Quantity of electricity supplied to recipient plants by project activity $EG_{j,y} = f_{wcm} \times EG_{i,j,y}$ *MWh*	0.514328x*145,537.23 = 74853.906*	0.463406x177,751 *.78 = 82371.23*
14	Quantity of waste gas used for electricity generation from WHRB1-4 (from 4x100TPD kilns) $Q_{WCM,y}$ Nm3	472,822,400	466,278,100
15	Density of waste gas used for electricity generation from WHRB1-4 (from 4x100TPD kilns) Kg/Nm3	1.335	1.335
16	Quantity of waste gas used for electricity generation from WHRB1-4 (from 4x100TPD kilns) $Q_{WCM,y}$ kgs	472,822,400x1.335 =631,217,904	466,278,100 x1.335 = 622,481,263.6
17	Quantity of waste gas used for electricity generation from WHRB5 (from 1x500TPD kilns) $Q_{WCM,y}$ Nm3	475,002,900	493,003,000
18	Density of waste gas used for electricity generation from WHRB1-4 (from 4x100TPD kilns Kg/Nm3	1.3649	1.3649
19	Quantity of waste gas used for electricity generation from WHRB5 (from 1x500TPD kilns) $Q_{WCM,y}$ kgs	475,002,900 x1.3649 =648,331,458.2	493,003,000 x1.3649 =672,899,794.7
20	Total Quantity of waste gas used for electricity generation $Q_{WCM,y}$ kgs	631,217,904 +648,331,458.2 =1,279,549,362.2	622,481,263.6 + 672,899,794.7 = 1,295,381,058
21	Quantity of waste gas used for electricity generation in baseline $Q_{WCM,BL}$ Nm3	1,067,921,600	1,067,921,600
22	Quantity of waste gas used for electricity generation in baseline $Q_{WCM,BL}$ kgs	1,440,402,952	1,440,402,952
23	Calculation of baseline cap $f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}}$	1,440,402,952/1,279,549,362.2 =1.1257	1,440,402,952/1,295,381,058 =1.1119
24	Baseline cap used in calculations f_{cap}	1	1
25	Ex ante CO_2 Emission factor for the grid displaced d project activity, during year y. $EF_{Elec\,i,j,y}$ tCO_2e/ *MWh*	*0.8032*	*0.8032*
26	Calculation of baseline emissions for the year tCO_2e $BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_j \sum_i (EG_{i,j,y} * EF_{Ele}$	1x0.514328x14553 7.23 *x* 0.8032 = 60122.66	1x0.463406x *177751.78 x 0.8032 =66160.57*
27	*Project emissions PE_y*	0	0
28	Leakage	0	0
29	*Emission reductions $ER_y = BE_y - PE_y$* tCO_2e	60122.66	*66160.57*
30	*Total Emission reductions for Monitoring period 01/07/2014 to 30/06/2016* tCO_2e	60122.66 + *66160.57 =126,283.23 Rounded to 126,283*	

E.2. Calculation of project emissions or actual net GHG removals by sinks

>> In project activity there is no consumption of auxiliary fuel to supplement waste gas/ heat. Also project activity does not involve the gas cleaning before being used for generation of energy hence there is no electricity consumption required as well as no other supplementary electricity consumption is involved in project activity. Therefore in line with requirement of methodology project emissions are not applicable for the project in activity

Therefore, ***PEy=0***

E.3. Calculation of leakage

>> Leakage is not applicable as per ACM0012 version 4 of methodology

E.4.Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	*126,283*	0	0	0	*126,283*	*126,283*

E.5.Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	222,096	*126,283*

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

>> The actual emission reductions are ***126,283*** tCO_2e against estimated reductions at the time of registration of **222,096** tCO_2e which is less by 43.1%. This is due to operational reasons as the waste energy available has lot of variations in flow and temperature and also due to shut downs of kilns.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☐ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Lloyds Steel Industries Division of Uttam Value Steels Limited
Street/P.O. Box	Senapati Bapat Marg
Building	Trade World "C" Wing
City	Mumbai
State/region	Maharashtra
Postcode	400013
Country	India
Telephone	022-30418111
Fax	022-30418260
E-mail	rmalegavi@lloyds.in
Website	www.lloyds.in
Contact person	
Title	Sr Vice President Technology
Salutation	Mr
Last name	Alegavi
Middle name	Mallikarjun
First name	Rajashekhar
Department	Engineering
Mobile	+91 9324172133
Direct fax	022-30418260
Direct tel.	022-30418221
Personal e-mail	rmalegavi@hotmail.com

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Lloyds Metals and Energy Limited (Formerly known as M/s Lloyds Metals & Engineers Limited)
Street/P.O. Box	
Building	A 1-2 MIDC Area
City	Ghugus
State/region	Maharashtra
Postcode	442505
Country	India
Telephone	07172-285071/285103
Fax	07172-285003
E-mail	www.lloydsin.com
Website	
Contact person	
Title	Chairman
Salutation	Mr
Last name	Gupta
Middle name	R
First name	Mukesh
Department	
Mobile	9892251000
Direct fax	022-30418260
Direct tel.	022-30418111
Personal e-mail	mrgupta@lloyds.in

Attachment. Instructions for filling out the monitoring report form

1. General instructions

1. When monitoring the project activity and completing the CDM-MR-FORM, in addition to following the the "CDM Project standard" (Project standard), the applied approved baseline and monitoring methodology(ies) (hereinafter referred to as the applied methodology(ies)) and, where applicable, the applied approved standardized baseline(s) (hereinafter referred to as the applied standardized baseline(s)), consult the "Rules and Reference" section of the UNFCCC CDM website. This section contains all regulatory documents for the CDM, such as standards (including methodologies, tools and standardized baselines), procedures, guidelines, clarifications, forms and the "Glossary: CDM terms".Make any data, values and formulae included in electronic spreadsheets provided accessible and verifiable.

2. Complete the CDM-MR-FORM and all attached documents in English, or include a full translation of relevant sections in English.

3. Complete the CDM-MR-FORM using the same format without modifying its font, headings or logo, and without any other alteration to the form.

4. Do not modify or delete tables and their columns in the CDM-MR-FORM. Add rows to the tables as needed. Add additional appendices as needed.

5. If a section of the CDM-MR-FORM is not applicable, explicitly state that the section is left blank intentionally.

6. Use an internationally recognized format for presentation of values in the CDM-MR-FORM, for example use digit grouping in thousands and mark a decimal point with a dot (.), not with a comma (,).

7. Complete the CDM-MR-FORM deleting this "Attachment: Instructions for filling out the monitoring report form".

2. Specific instructions

1. Indicate on the cover page the following information:
   (a) Title of the project activity;
   (b) Reference number of the project activity;
   (c) Version number of the monitoring report;
   (d) Completion date of the monitoring report (DD/MM/YYYY);
   (e) Monitoring period number and duration of this monitoring period. The monitoring period number is an ordinal number referring to the chronological order of monitoring periods (e.g. "first monitoring period"). For the monitoring period dates, first and last days are included (DD/MM/YYYY – DD/MM/YYYY);
   (f) Project participant(s);
   (g) Host Party;
   (h) Sectoral scope(s). List all sectoral scopes applicable to the project activity;
   (i) Selected methodology(ies). List all the selected methodologies and combination of methodologies applicable to the project activity;
   (j) Selected standardized baseline(s). List all the selected standardized baseline applicable to the project activity;
   (k) Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD;
   (l) Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period - GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012 (if applicable); GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards (if applicable).

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

1. Provide a brief summary of the detailed description given in section B.1 in terms of:
   (a) Purpose of the project activity and the measures taken for GHG emission reductions or net GHG removals by sinks;
   (b) Brief description of the installed technology and equipment;
   (c) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.);
   (d) Total GHG emission reductions or net GHG removals by sinks achieved in this monitoring period.

A.2. Location of project activity

1. Provide the following information on the location of the project activity:
   (a) Host Party;
   (b) Region/state/province, etc.;
   (c) City/town/community, etc.;
   (d) Physical/geographical location.

A.3. Parties and project participant(s)

1. List in the table Party(ies) and project participant(s) involved in the project activity.

A.4. Reference of applied methodology and standardized baseline

1. Indicate the exact reference (number, title, version) of:
   (a) The applied methodology(ies) (e.g. ACM0001: "Large-scale consolidated methodology: Flaring or use of landfill gas" (version 15.0));
   (b) Any tools and other methodologies to which the applied methodology(ies) refers (e.g. "Methodological tool: Tool for the demonstration and assessment of additionality" (version 07.0.0));

(c) The applied standardized baseline(s), where applicable (e.g. ASB0001 "Standardized baseline: Grid emission factor for the Southern African power pool" (version 01.0)).

2. Refer to the UNFCCC CDM website for the exact reference of the applied methodologies, tools and standardized baselines.

A.5. Crediting period of project activity

1. Provide the type, start date and length of the crediting period corresponding to this monitoring period.

A.6. Contact information of responsible persons/entities

1. Provide contact information of the person(s)/entity(ies) responsible for completing the CDM-MR-FORM and indicate whether the person(s)/entity(ies) is(are) also a project participant(s) in Appendix 1

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

1. Provide information on the implementation status of the project activity during this monitoring period in accordance with the applicable provision for description of implemented registered CDM project activity in the Project standard.
2. For the description of the installed technology(ies), technical process and equipment, include diagrams, where appropriate.
3. If applicable, present information on any request for prior approval by the Board of changes to the registered CDM project activity in section B.2.1, B.2.2, B.2.3, B.2.4, B.2.5 and/or B.2.6.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

1. Indicate whether any temporary deviations have been applied during this monitoring period. If applied, provide a description of the deviation(s) in accordance with applicable provisions for temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baseline in the Project standard.
2. Include the reasons for the deviation(s), how it deviates from the monitoring plan, applied methodology(ies) and/or applied standardized baseline, the duration for which the deviation(s) is(are) applicable and justification on the conservativeness of the approach.
3. For deviation(s) that require prior approval by the Board, include the date of approval and reference number. Otherwise, provide the version number and the completion date of the revised PDD and DOE assessment opinion on the request for post-registration changes that is being submitted with this monitoring report.

B.2.2. Corrections

1. Indicate whether any corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the correction(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD and the DOE assessment opinion on the request for post-registration changes that is being submitted with this monitoring report.

B.2.3. Changes to start date of crediting period

1. Indicate whether any changes to the start date of the crediting period have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the changes and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

1. Indicate whether the inclusion of a monitoring plan into the PDD for which the delayed submission of the monitoring plan was chosen by the project participants at the time of the registration of the project activity, has been approved by the Board prior to the submission of this monitoring report or is being submitted together with this monitoring report.
2. If the inclusion of a monitoring plan into the registered PDD has been approved by the Board prior to the submission of this monitoring report, provide the date of approval and reference number.

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

1. Indicate whether any permanent changes from the registered monitoring plan, applied methodologies or applied standardized baseline have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD and DOE assessment opinion on the request for post-registration changes that is being submitted with this monitoring report.

B.2.6. Changes to project design of registered project activity

1. Indicate whether any changes to the project design of the project activity have been approved during this monitoring period or submitted with this monitoring report.
2. In cases where the change(s) and the revised PDD are approved prior to the submission of this monitoring report for request for issuance, provide the approval date and reference number. Otherwise, provide the version number and the completion date of the revised PDD and DOE assessment opinion on the request for post-registration changes that is being submitted with this monitoring report.

B.2.7. Types of changes specific to an afforestation or reforestation project activity

1. Indicate whether any changes specific to afforestation or reforestation project activities have been applied during this monitoring period based on applicable provisions in the Project standard that do not require prior approval by the Board. If changes were applied, provide the version number and the completion date of the revised PDD and DOE assessment opinion on the request for post-registration changes that is being submitted with this monitoring report.

SECTION C. Description of monitoring system

1. Provide a description of the monitoring system based on the applicable provision for description of monitoring system in the Project standard. Include diagrams of the monitoring system and the information flow where appropriate.

SECTION D. Data and parameters

1. Provide information on all data and parameters in accordance with applicable provisions for data and parameters in the Project standard, using the tables provided in sections D.1and D.2.
2. For “Purpose of data” in the tables in D.1 and D.2, choose one of the following options:
   (a) Calculation of baseline emissions or baseline net GHG removals by sinks;
   (b) Calculation of project emissions or actual net GHG removals by sinks;
   (c) Calculation of leakage.
3. Where the applied standardized baseline(s) standardizes baseline emissions, apply the standardized value(s) of the parameter(s) in section D.1 and/or D.2 in accordance with applicable provisions related to data and parameters in the Project standard.

D.1. Data and parameters fixed ex ante or at renewal of crediting period

1. Include data that are fixed before registration and/or at the renewal of crediting period and are used during this monitoring period under section D.1.
2. For “Value(s) applied”, use one table to report multiple values referring to the same data and parameter, if applicable. Use reference(s) to electronic spreadsheets, if necessary.

D.2. Data and parameters monitored

1. For "Monitoring equipment" in the table, provide information on type, accuracy class, serial number, calibration frequency, date of last calibration and validity.
2. For "Value(s) of monitored parameter", use one table to report multiple values referring to the same data and parameter, if applicable. Use reference(s) to electronic spreadsheets, if necessary.

D.3. Implementation of sampling plan

1. If data and parameters monitored described in section D.2 above are determined by a sampling approach, provide a description on how project participants implemented the sampling efforts and surveys for those data and parameters according to the sampling plan. Include:
   (a) Description of implemented sampling design;
   (b) Collected data (attach and provide reference to electronic spreadsheets, if necessary);
   (c) Analysis of the collected data;
   (d) Demonstration on whether the required confidence/precision has been met.

SECTION E. Calculation of emission reductions or GHG removals by sinks

1. For the parameter global warming potentials (GWPs), from 1 January 2013, include the values adopted by decision 4/CMP.7 to calculate the emission reductions achieved in the second commitment period of the Kyoto Protocol in accordance with the applicable provisions in the Project standard.

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

1. Provide sample calculations for all formulae used and calculation of baseline emissions or baseline net GHG removals by sinks, applying actual values. Attach electronic spreadsheets to present full calculations in the monitoring report.

E.2. Calculation of project emissions or actual net GHG removals by sinks

1. Provide sample calculations for all formulae used and calculation of project emissions or actual net GHG removals by sinks, applying actual values. Attach electronic spreadsheets to present full calculations in the monitoring report.

E.3. Calculation of leakage

1. Provide sample calculations for all formulae used and calculation of leakage, applying actual values. Attach electronic spreadsheets to present full calculations in the monitoring report.

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

1. Summarize the results of sections E.1, E.2, E.3 above and provide GHG emission reductions or net GHG removals by sinks for this monitoring period, using the table.
2. If the monitoring period starts before 31 December 2012 and ends anytime thereafter, provide actual GHG emission reductions or net GHG removals by sinks achieved for the following two periods respectively:
   a) Up to 31 December 2012 (first commitment period); and
   b) From 1 January 2013 onwards.
3. Calculate the achieved GHG emission reductions or net GHG removals by sinks proportionally for each period. In cases where annual caps were applied in the calculations, prorate the annual caps to each period.

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

1. Provide a comparison of actual GHG emission reductions or net GHG removal of the project activity achieved during this monitoring period with the estimates in the registered PDD.

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

1. Explain the cause of any increase in the actual GHG emission reductions achieved during this monitoring period based on the applicable provision for calculation of GHG emission reductions in the Project standard.

Appendix 1. Contact information of project participants and responsible persons/entities

1. In accordance with section A.6 above, complete the table, with the following mandatory fields: Project participant and/or responsible person/entity, Organization, Street/P.O. Box, City, Postcode, Country, Telephone, Fax, E-mail and Name of contact person. Copy and paste the table as needed.

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Document information

Version	*Date*	*Description*
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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