

Verification & Certification Report

Project Title
**LMEL 25 MW Waste Heat
based Captive Power Plant**

UN Ref. No. **9003**
Monitoring Period: **27/05/2013 to 30/06/2014**

For
M/s Lloyds Metals and Energy Limited

Report No.
CDM.VER.14.13 MP01

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Executive Summary:

A) Basic information				
Project title	"LMEL 25 MW Waste Heat based Captive Power Plant"			
UNFCCC registration number	9003			
Date of registration	27/05/2013			
Sectoral scope	1 , 4			
Methodology/ies applied	ACM0012 Version 04.0.0			
Project participant	M/s Lloyds Metals and Energy Limited (<i>formerly</i> known as Lloyds Metals & Engineers Limited)			
B) Verification				
Start date of crediting period	27/05/2013			
Monitoring Period	27/05/2013 to 30/06/2014 (both dates included)			
Emission Reductions in (*comparable period)	MR	71,302 tCO ₂ e	PDD*	106,421 tCO ₂ e
C) Monitoring report	Version		Date	
Publication	0		06/08/2014	
Final	4		10/08/2015	
D) Verification report	Version		Date	
Draft	1		17/10/2014	
Final	4		12/10/2015	
E) Verification Team				
Team Leader & Verifier	Pankaj Mohan			
Technical Expert (TA 1.1)	Pankaj Mohan			
Technical Expert (TA 4.3)	Lalit Kumar Singhania			
F) Approvals				
Technical Reviewer	Ashok Kumar Gautam	Date	03/11/2015	
Technical Expert (TA 1.1)	Ashok Kumar Gautam			
Technical Expert (TA 4.3)	Tarit Roy			
G) Final opinion				
<p>Earthood has performed the 1st verification of the CDM project "LMEL 25 MW Waste Heat based Captive Power Plant" and UNFCCC Ref. Number 9003. The verification includes confirming the implementation of the monitoring plan of the PDD and the application of the monitoring methodology as per ACM0012 Version 04.0.0. The emission reductions from the CDM project activity 9003 "LMEL 25 MW Waste Heat based Captive Power Plant" in India during the period 27/05/2013 to 30/06/2014 (including both days) amount to 71,302 tCO₂e. This verification concludes that the aforementioned quantity of emission reductions for the 1st monitoring period is measured and real. The request for issuance of CERs may be submitted to the CDM EB.</p> <p>Post Registration Changes in the PDD are also proposed by the project proponent along with this verification. This verification report also includes the combined assessment opinion for all the changes that are proposed in the revised PDD Version 11.0. Earthood confirms that the implementation of the post registration changes is in line with the applied methodology and all other applicable tools and guidance.</p>				
H) Authorization				
Managing Director	Kaviraj Singh			
Date	09/11/2015			
I) Distribution				
No public distribution without written confirmation from client.				

J) Verification Status	
Findings Status	Closed
Draft report	No
Final report	Yes

Abbreviations

ABC	After Burning Chamber
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
CPP	Captive Power Plant
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CL	Clarification Request
DCS	Digital Control System
DM	De-Mineralized
DOE	Designated Operational Entity
DNA	Designated National Authority
DRI	Direct Reduced Iron
EB	Executive Board
ESP	Electro Static Precipitator
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
LMEL	Lloyds Metals and Energy Limited.
MSEDCL	Maharashtra State Electricity Distribution Company Ltd
MR	Monitoring Report
MWh	Mega Watt hour
MW	Mega Watt
NM ³ /h	Normal Meter Cube per Hour
PDD	Project Design Document
RMP	Revised Monitoring Plan
VVS	Validation and Verification Standard
STG	Steam Turbine Generator
SPM	Suspended Particulate Matter
tCO ₂	Tonnes Carbon-dioxide
tCO ₂ eq	Tonnes Carbon-dioxide equivalent
TPD,tpd	Tonnes per Day
Tones/h	Tonnes per hour
T&D	Transmission and Distribution
TG	Turbine Generator
WHR	Waste Heat Recovery
WHRB	Waste Heat Recovery Boiler
UNFCCC	United Nations Framework Convention on Climate Change

Contents

EXECUTIVE SUMMARY:	2
ABBREVIATIONS	3
1. INTRODUCTION	5
1.1 Objective	5
1.2 Scope	5
1.3 Basic information of project activity	5
2. METHODOLOGY	6
2.1 Desk Review	6
2.2 Site Visits	7
2.3 Reporting of Findings	7
2.4 Technical Review	8
3. VERIFICATION FINDINGS	9
3.1 Remaining Issues (FAR(s) from validation or previous verification)	9
3.2 Project implementation	9
3.3 Compliance of monitoring plan with monitoring methodology	9
3.4 Post registration changes, if any	9
3.5 Compliance of monitoring with monitoring plan	14
3.6 Data not monitored (ex ante or external parameters)	37
3.7 Assessment of data and calculation of emission reductions	38
3.8 Quality of evidence to determine emission reductions	39
3.9 Management system and quality assurance	39
4. REFERENCES	40
5. CERTIFICATION STATEMENT	44
6. FINDINGS (CAR/CL/FAR)	45
7. CV OF VERIFICATION TEAM	51

1. INTRODUCTION

1.1 Objective

M/s Lloyds Metals and Energy Limited has contracted Earthood Services Private Limited (Earthood) to conduct the first verification and certification of emission reductions reported for the CDM project activity UN 9003 "LMEL 25 MW Waste Heat based Captive Power Plant" in India for the period 27/05/2013 to 30/06/2014. This report contains the findings of the verification process and a certification statement for the certified emission reductions.

The verification is the periodic independent review and *ex post* determination by Earthood of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period. Certification is the written assurance by Earthood that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the "LMEL 25 MW Waste Heat based Captive Power Plant" for the period 27/05/2013 to 30/06/2014.

1.2 Scope

The scope of the verification is to establish/verify that:

- The project activity has been implemented and operated as per the registered PDD or any approved revised PDD, and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- The monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of CERs, verifiable, and in accordance with applicable CDM requirements;
- The actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan, any revised approved monitoring plan, the approved methodology including applicable tool(s) and/or, where applicable, the approved standardized baseline;
- The data recorded and stored as per the monitoring methodology including applicable tool(s) and, where applicable, the standardized baseline.

1.3 Basic information of project activity

Title of project activity	"LMEL 25 MW Waste Heat based Captive Power Plant"
UNFCCC Reg. No.	9003
Scale of project activity	Large Scale
Applied Methodology/ies	ACM0012 Version 04.0.0
Sectoral Scope(s) / Technical Area(s)	1, 4 TA 1.1; TA 4.3
Project participants	Lloyds Metals and Energy Limited (<i>Formerly</i> known as Lloyds Metals & Engineers Limited)
Host Party	India
Location of project activity	Longitude 79° 07' 15" E, Latitude 19° 56' 15" N
Start date of crediting period (with reference to this monitoring period)	27/05/2013
Type and length of crediting period	Fixed Crediting Period (10 Years)
Monitoring period	27/05/2013 to 30/06/2014

2. METHODOLOGY

Earthood assessed and determined whether the implementation and operation of the project activity, and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the Board.

The assessment involved a desk review of relevant documentation as well as an on-site visit(s). The personnel employed and their roles in this assessment is mentioned below;

Role	Name	Nature of involvement					
		Desk Review	On Site Visit	Reporting	Supervision	Technical Review	TA Expert
Team Leader	Pankaj Mohan	Y	Y	Y	Y	-	-
Verifier	Pankaj Mohan	Y	Y	Y	N	-	-
Technical Expert (TA 1.1)	Pankaj Mohan	Y	Y	N	N	-	-
Technical Expert (TA 4.3)	Lalit Kumar Singhania	Y	Y	N	N	-	-
Technical Reviewer	Ashok Kumar Gautam	-	-	-	-	Y	-
Technical Expert (TA 1.1)	Ashok Kumar Gautam	-	-	-	-	-	Y
Technical Expert (TA 4.3)	Tarit Roy	-	-	-	-	-	Y

The CV of verification team members is included under Section 7.

Verification milestones:

Monitoring report publication:	13/09/2014
Desk review:	27/09/2014 - 27/09/2014
On-site assessment:	29/09/2014 - 30/09/2014
Reporting, calculation checks and QA/QC:	30/09/2014 - 14/09/2015
Draft Verification Report	17/10/2014
Final Verification Report	12/10/2015

Earthood followed a rule based verification approach, wherein, the contract review is undertaken as per valid/effective version of CDM Accreditation Standard. Once the contract is agreed for verification, the monitoring report of the project activity is made publicly available at UNFCCC website as per CDM procedures. Key steps are described in Section 2.1 to 2.4 of this report.

2.1 Desk Review

Earthood conducted a desk review as under;

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan, the monitoring methodology including applicable tool(s) and, where applicable, the applied standardized baseline, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions;

In addition to the monitoring documentation, Earthood has reviewed;

- The registered PDD Version 9 dated 10/5/2013 /1/ and the monitoring plan, including revised PDD /38/, and the corresponding validation opinion;
- The Validation Report Version 2 dated 21/05/2013 /2/;

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- Previous verification reports, if any; (Not applicable)
 - The applied monitoring methodology (ACM0012 Version 04.0.0) and, where applicable, the applied standardized baseline /3/;
 - The monitoring report (all versions) to verify that it is as per the standardized format;
 - Any other information and references relevant to the project activity's emission reductions (e.g. IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).

The complete list of documents reviewed is included under Section 4.

2.2 Site Visits

A site visit was undertaken by Earthood on 29/09/2014 – 30/09/2014 to carry out following;

- An assessment of the implementation and operation of the registered project activity as per the registered PDD or any approved revised PDD;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;
- A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.3 Reporting of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and onsite assessment. The verification team prepares and/or updates a verification protocol (internal document) that records the conformities and non-conformities, which may be of following types;

CAR (Corrective Action Request) is raised if one of the following occurs:

- Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CLs raised by the Earthood during verification shall be resolved prior to submitting a request for issuance.

FAR (Forward Action Request) is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

All the findings that are raised and communicated to project participant during the verification are included under Section 6. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.4 Technical Review

A draft verification report that is prepared by verification team is reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by Earthood were duly complied with and such opinion/conclusion is reached in an objective manner that complies with the applicable CDM rules/requirements. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the verification team.

During the technical review process additional findings may be identified or the closed out findings may be opened, which needs to be satisfactorily resolved before the request for issuance is submitted to UNFCCC. The independent technical reviewer may either approve the report as such or reject/return the same in such case providing the comments/findings/issues that needs to be resolved by the verification team. The decision taken by the Technical Reviewer is final and is authorized by the Managing Director on behalf of Earthood Services Private Limited.

3. VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the LMEL 25 MW Waste Heat based Captive Power Plant for the monitoring period 27/05/2013 to 30/06/2014.

3.1 Remaining Issues (FAR(s) from validation or previous verification)

This is the first verification of the project activity. There are no FAR(s) from validation that need to be addressed during this verification.

3.2 Project implementation

The project participant in registered PDD was mentioned as “Lloyds Metals & Engineers Limited”. However, the contract was signed with “Lloyds Metals and Energy Limited”. This was also discussed at the time of contract review and it was clarified by the project participant that the name of the entity has been changed to “Lloyd Metals and Energy Limited” since 25/04/2011. During desk review and site visit, it was clarified by the project proponent that the communication along with the required documents for name change is made available to UNFCCC on date 22/09/2014 in accordance with the Project Cycle Procedure Version 7.0. The verification team confirmed from the certificate of incorporation /35/ and the company website /36/ that the latest legal name of the company is “Lloyds Metals and Energy Limited”. The email submitted to UNFCCC were also checked and verified by the verification team /37/. Therefore, the verification team accepted the change of name of the project participant in the revised PDD and the MR. As per the request from UNFCCC in regard to post-registration changes, the revised MOC and HCA is also submitted along with the request for post registration changes and issuance for this verification /37/.

The project activity comprises of installation and operation of 4 X 12 TPH and 1 X 55 TPH Waste Heat Recovery Boiler (WHRB) and 1 X 90 TPH Coal based Fluidized Bed Combustion Boiler connected to a 30 MW turbine via a common steam header. The purpose of the project activity is generation of power to fulfil 3.5 MW of internal electricity requirement, 2.5 MW of auxiliary requirement of the project activity and supply of surplus power to identified customer via Maharashtra State Electricity Distribution Company Limited (MSEDCL) grid. The verification team confirmed the accuracy of the geographical location of the project during on site assessment using hand-held device. The verification team also confirmed the consistency of the physical aspects of the project design as reported under Section A.1 of monitoring report. It was confirmed by the verification team that all equipment associated with the project were found to be completely installed and operational. The certificates for the use of the boiler were reviewed and found that the boilers were being operated in accordance with the local regulations of the host country. /7,8,9,10,11,12/

There is no increase of the emission reductions in the current monitoring period as compared to the estimated emission reductions claimed in the registered PDD.

3.3 Compliance of monitoring plan with monitoring methodology

Due to the post registration changes proposed along with this verification (discussed below in section 3.4), the latest version of the revised PDD /38/ is referred to determine the compliance of the monitoring plan with the monitoring methodology. The verification team confirms that the monitoring plan was found in accordance with the approved methodology and applied by the registered CDM project activity. All tools are also mentioned in the MR correctly as checked by the verification team.

3.4 Post registration changes, if any

During verification of the current monitoring period, the verification team identified that registered PDD contained information, which was found inconsistent with the actual implementation of the project activity. Please refer findings (section 6) for details. In response, the following post-registration changes were made in the revised PDD:

Table 3.4.1: Summary of Post Registration Changes in the PDD

S.N	Proposed/Actual changes in revised PDD	Validation Conclusion
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1.	<p><u>Section B.3 Project Boundary</u></p> <p>Permanent Change from Registered Monitoring Plan</p> <p>The schematic diagram of the project boundary has been modified since the position of energy meter “Me4” depicted in the diagram was not consistent with the actual implementation. The registered PDD depicts the energy meter on the 11 KV line which is before the step up transformer. In the revised PDD, the schematic diagram of the project boundary has been corrected to present the “Me4” meter on 220 KV line after the transformer which is consistent with the actual implementation. Further, the monitoring points related to “Me1”, “Me2A”, “Me2B”, “Me2D”, “Me3A” and “Me3B” are also illustrated in the diagram to ensure its completeness.</p>	<p>As per paragraph 5 (c) of Appendix 1 of PS Version 7.0, “<i>Changes to the monitoring of the registered CDM project activity of a type listed below do not require prior approval by the Board:</i></p> <p>.....</p> <p><i>(c) Change of location of meter(s) as per a power purchase agreement (PPA).”</i></p> <p>The calibration certificate issued by MSEDCL describes that the energy meter “Me4” is installed at 220 KV feeder at Lloyd’s end /22.7/. The on-site inspection of the project site also established that the energy meter “Me4” was located on the 220 KV line which is after the transformer. The verification team observed that the meter was sealed by the Grid Authority and can only be accessed in presence of the authorized person from the Grid Authority. Further, it was verified from the document “Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006” /33/ that all the interface meters installed at the interconnection of generating company and the inter-state transmission system shall be duly sealed during operations and can only be physically accessed in presence of the generating company and the transmission utility company. Therefore, it was concluded that the energy meter “Me4” is not under the control of the project proponent and the change complies with the provisions of paragraph 5(c) of Appendix 1 of PS Version 7. Therefore, the verification team accepted the change as permanent change from the registered monitoring plan with no requirement for prior approval from the Board. The positioning of “Me1”, “Me2A”, “Me2B”, “Me2D”, “Me3A” and “Me3B” meters illustrated in the schematic diagram was also consistent with the actual implementation.</p> <p>The revised PDD reflects the monitoring arrangement as existing on ground and comply with the applied methodology in this regard. These do not reduce the level of accuracy in any manner.</p>
2.	<p><u>Section B.7.1, Data and parameters to be monitored</u></p> <p>The parameters $EG_{i,j,y}$ (<i>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</i>) and $EG_{export,y}$ (<i>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</i>)</p>	<p>The on-site inspection of the project site revealed that the make of energy meters “Me2A”, “Me2B”, “Me2D”, “Me3” and “Me4” was “ELSTER (model – Alpha M++) /22/. This was further validated from the calibration certificates of each of the meter which clearly mentions the make of the meter as “ELSTER”. It was verified from the daily electrical log-sheets (totalizer readings) that all the meters were installed from the start of operations of the project activity and are in continuous operation. It revealed that the specification of energy meters were available at the time of preparation of PDD Version 9 dated</p>

	<p>Correction</p> <p>The make of energy meters “Me2A”, “Me2B”, “Me2C”, “Me2D”, “Me3” and “Me4” was mentioned as CONZERVE (model – EM 6400) in the registered PDD. However, the actual meters installed were of the make ELSTER (model – Alpha M++). In the revised PDD, the section has been modified to present the correct information.</p>	<p>10/05/2013. Therefore, the verification team concluded that the inconsistent description in the registered PDD is a typographical error. Since the actual meters installed on site are of higher accuracy class than the one described in the PDD, the typographical error will not have any impact on the accuracy of the emission reduction calculation or the design of the project activity.</p> <p>As per paragraph 1 of Appendix 1 of PS Version 7.0, the changes in the PDD due to typographical errors shall be validated as corrections. Therefore, the verification team accepted the change as correction.</p> <p>The revised PDD reflects the monitoring arrangement as existing on ground and comply with the applied methodology in this regard. These do not reduce the level of accuracy in any manner.</p>
3.	<p><u>Section B.7.1, Data and parameters to be monitored</u></p> <p>The parameters</p> <p>a) $Q_{whr\ steam}$ (<i>Quantity of steam from WHRB used for electricity generation</i>)</p> <p>b) $Q_{other\ steam(FBC\ steam)}$ (<i>Quantity of steam from other boilers used for electricity generation</i>)</p> <p>Correction</p> <p>The accuracy class of the steam flow meters installed at WHRBs and FBC boiler has been reported as 0.2 % in the registered PDD which was a typographical error. However, the accuracy class of the actual meters is 0.075% which are installed from the starting of the operations. In the revised PDD, the section has been modified to present the correct information.</p>	<p>The on-site inspection of the project site revealed that the accuracy class of the steam flow meters was 0.075% of Full Scale Deflection (FSD). This was further validated from the calibration certificates of each of the meters which clearly mentions the accuracy class as 0.075% /20/. It was verified from the daily production log-sheets (totalizer readings) that all the meters were installed from the start of operations of the project activity and are in continuous operation. It revealed that the specification of flow-meters were available at the time of preparation of PDD Version 9 dated 10/05/2013. Therefore, the verification team concluded that the inconsistent description in the registered PDD is a typographical error. Since the actual meters installed on site are of higher accuracy class than the one described in the PDD, the typographical error will not have any impact on the accuracy of the emission reduction calculation or the design of the project activity.</p> <p>As per paragraph 1 of Appendix 1 of PS Version 7.0, the changes in the PDD due to typographical errors shall be validated as corrections. Therefore, the verification team accepted the change as correction.</p> <p>The revised PDD reflects the monitoring arrangement as existing on ground and comply with the applied methodology in this regard. These do not reduce the level of accuracy in any manner.</p>
4.	<p><u>Section B.7.1, Data and parameters to be monitored</u></p> <p>The parameters</p> <p>a) $t_{wcm,h}$ (<i>WECM-Flue gas temperature at WHR boilers inlet</i>)</p> <p>b) $t_{wcmsteam} / t_{othersteam}$ (<i>Steam temperature at inlet to Steam turbine generator</i>)</p>	<p>It was verified through physical inspection of the project site that the make for all thermocouples is “ABB” and the accuracy of all thermocouples is 0.075%. This was further validated from the calibration certificates of each of the meters which clearly mentions the name and accuracy class as “ABB” and 0.075% respectively /18/. It was verified from the daily production log-</p>

	<p>c) T_{BFW} (<i>Boiler feed water temperature at all boilers</i>)</p> <p>Correction The make and accuracy class for all temperature thermocouples was mentioned as “Yokogawa” and “0.2 %” respectively in the registered PDD. However, the actual make of the installed thermocouples was “ABB” and the accuracy class of the thermocouples was 0.075% which are installed from the starting of the operations. In the revised PDD, the section has been modified to present the correct information.</p>	<p>sheets that the thermocouples were installed from the start of operations of the project activity and are in continuous operation. It revealed that the specification of temperature thermocouples were available at the time of preparation of PDD Version 9 dated 10/05/2013. Therefore, the verification team concluded that the inconsistent description in the registered PDD is a typographical error. Since the actual meters installed on site are of higher accuracy class than the one described in the PDD, the typographical error will not have any impact on the accuracy of the emission reduction calculation or the design of the project activity. As per paragraph 1 of Appendix 1 of PS Version 7.0, the changes in the PDD due to typographical errors shall be validated as corrections. Therefore, the verification team accepted the change as correction. The revised PDD reflects the monitoring arrangement as existing on ground and comply with the applied methodology in this regard. These do not reduce the level of accuracy in any manner.</p>
5.	<p><u>Section B.7.1, Data and parameters to be monitored</u> The parameter $P_{\text{whr steam}} / P_{\text{other steam}}$ (<i>Steam pressure at Steam Turbine Inlet</i>)</p> <p>Correction The accuracy class of the “Yokogawa” make pressure transmitter was mentioned as “0.2 %” in the registered PDD. However, the actual accuracy class of the pressure transmitter was 0.075%. In the revised PDD, the section has been modified to present the correct information.</p>	<p>It was verified through physical inspection of the project site that the accuracy of all “Yokogawa” make pressure transmitter is 0.075%. This was further validated from the calibration certificate of the meter which clearly mentions the accuracy class as 0.075% /23/. It was verified from the daily production log-sheets that the pressure transmitters were installed from the start of operations of the project activity and are in continuous operation. It revealed that the specification of pressure transmitters were available at the time of preparation of PDD Version 9 dated 10/05/2013. Therefore, the verification team concluded that the inconsistent description in the registered PDD is a typographical error. Since the actual meters installed on site are of higher accuracy class than the one described in the PDD, the typographical error will not have any impact on the accuracy of the emission reduction calculation or the design of the project activity. As per paragraph 1 of Appendix 1 of PS Version 7.0, the changes in the PDD due to typographical errors shall be validated as corrections. Therefore, the verification team accepted the change as correction. The revised PDD reflects the monitoring arrangement as existing on ground and comply with the applied methodology in this regard. These do not reduce the level of accuracy in any manner.</p>
6.	<p><u>Section B.7.1, Data and parameters to be monitored</u> The parameter</p>	<p>In the registered PDD, the parameter $EG_{i,j,y}$, was calculated as the difference of metered values of gross electricity generation and auxiliary consumption of power plant. i.e.</p>

	<p>$EG_{i,j,y}$ (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)</p> <p>Permanent Change from Registered Monitoring Plan In the registered PDD, the parameter is calculated as the difference of metered values of gross electricity generation and auxiliary consumption of power plant. i.e. $EG_{gross} - EG_{Auxiliary}$. The same could be cross checked from the sum of export electricity metered by energy meter "Me4" and in house consumption electricity meter "Me3". However due to transformer losses and import from grid, the conservative approach of sum of In-house Consumption (Me3) and the net exports to Grid (Me4 Exports – Me4 Imports) was adopted in the revised PDD and MR. Therefore, in the revised PDD, the same approach (as above) is considered as the primary source for ER calculation while the other approach i.e. "Me1" – "Me2" is reported as the approach for cross check.</p>	<p>$EG_{gross} - EG_{Auxiliary}$. While the same is cross checked from the sum of "Me3" and "Me4" meter. The verification team observed that the approach represents net generation from project activity (after auxiliary consumption). It was further observed that the registered monitoring plan did not account the transformer losses and the occasional imports from the grid through "Me4" meter. For example, the parameter $EG_{i,j,y}$ as per the first approach was calculated to be 144,095.4 MWh for the current monitoring period which also includes emissions due to transformer losses (1189 MWh) and imports from grid (323.4 MWh) and hence not conservative.</p> <p>The provisions in Paragraph 5(c) of Appendix 1 of PS Version 7 allows changes in registered monitoring plan which are related to meter location. This is further elaborated in PS Version 9 /39/ paragraph 5(d) where it clearly mentions that any change in monitoring plan due to change in location of meter to account for transmission losses does not require prior approval, which was reviewed for further guidance on this matter.</p> <p>Since the change is proposed to account for the transmission losses due to change in location of energy meter 'Me4' as described in point 1, it complies with the above provision of PS Version 7 (further elaborated in PS Version 9). Hence, the verification team accepted the sum of In-house consumption at LMEL process facility ("Me3") and net exports to grid (export by "Me4" – import from "Me4") as the value of parameter $EG_{i,j,y}$ and agreed for revision to the approach defined in the registered PDD.</p> <p>The revised PDD reflects the monitoring arrangement as existing on ground and comply with the applied methodology in this regard. These do not reduce the level of accuracy in any manner.</p>
7.	<p><u>Section B.7.1, Data and parameters to be monitored</u> The parameter $EG_{i,j,y}$ (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)</p> <p>Permanent Change from Registered Monitoring Plan In the registered PDD, the Calibration frequency for all energy meters is mentioned as "Annual". However, the meter is not controlled by the project participant. The grid authority i.e. MSEDCL is solely authorized and responsible for the calibration of the meter. Therefore, the calibration</p>	<p>The verification team observed during physical inspection of the site that the meter was sealed by MSEDCL and the meter can only be physically accessed in the presence of the authorized official from MSEDCL. Further, it was verified from the "Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006" /33/ that all the interface meters installed at the interconnection of generating company and the inter-state transmission system shall duly sealed during operations and can only be physically accessed in presence of the generating company and the transmission utility company. Therefore, it is verified by the team that the meter was not in control of the project proponent. As per paragraph 5 (a) of Appendix 1 of Project Standard Version 7, the prior approval from the</p>

	frequency is revised from “annual” to “at least once in 3 years”.	<p>CDM Board is not required in case of change in calibration frequency if the meter is not in control of the project proponent. It was also verified from the manufacturer’s brochure that the Alpha Plus Elster Meters are designed for years of continuous trouble-free service and do not require on field calibration /34/. Therefore, the verification team accepted the change in PDD.</p> <p>The revised PDD reflects the monitoring arrangement as existing on ground and comply with the applied methodology in this regard. These do not affect the level of accuracy as it is not related to accuracy of monitoring equipment. Further, as discussed above, these are not in the control of PP and therefore accepted as per CDM PS.</p>
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The verification team confirmed through desk review and onsite assessment that all the above revisions to the PDD are consistent with the actual implementation of the project activity and comply with the provisions of Appendix 1 of Project Standard Version 7 /27/. It is also confirmed that the above changes do not impact the compliance of project design with the applied methodology and do not reduce the level of accuracy in any manner. Therefore, the revised PDD /38/ is processed along with the current request for issuance in accordance with the provisions of “Post Registration Changes” described in para 294(a) of the VVS Version 7 /29/.

3.5 Compliance of monitoring with monitoring plan

The below tables describe how each parameter, which is to be monitored according to the monitoring plan, has been verified by the verification to confirm that the actual monitoring activities complies with the monitoring plan, monitoring data has thoroughly assessed and that the calibration requirements are met.

3.5.1 Data/Parameter, Unit: Quantity of waste gas used to generate electricity during the year y, $Q_{wcm,y}$ (kg/year)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	<p>The parameter represents the total quantity of waste gas generated by all the kilns during the monitoring period. All the generated waste gas is fed to the respective WHRB connected to the kiln and used to generate electricity.</p> <p><u>Frequency of data measurement</u> : On continuous basis</p> <p><u>Recording frequency</u> : On hourly basis in logbook</p>
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	<p>Ultrasonic Meters:</p> <p>ID: B1_FG_101, Serial number GM-724 E</p> <p>ID: B2_FG_101, Serial number GM-724 E</p> <p>ID: B3_FG_101, Serial number GM-791 E</p> <p>ID: B4_FG_101, Serial number GM-791 E</p> <p>ID: B5_FG_101, Serial number GM-722 E</p>

	The monitoring of waste gas is done at exit of each WHRB using online ultrasonic flow meter. The mass quantity of waste gas is calculated by multiplying the density of waste gas at NTP (which is an ex-ante parameter « $d_{WCM,BL}$ ») with the volume of the flue gas, as measured by the meter, during the monitoring period. The verification of the density of waste gas is reported in section 3.6.3 below.
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	"The accuracy of the meter is 2.0% as provided by GE in the specifications." /21/
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, the accuracy of instrument used is valid for entire measuring range.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes. The monitoring plan of the registered PDD and the revised PDD Version 11 mentions the calibration frequency of the ultrasonic meter as yearly. The calibration of all meters for 2013 was performed on 20/04/2013 with a validity of calibration upto 19/04/2014. The calibration for 2014 was performed on 19/04/2014 to cover the complete monitoring period. /21/
Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes. The master equipments used by the calibration lab are calibrated by NABL accredited lab. The ultrasonic meter is calibrated by Arrow instruments Calibration Company. The following master calibrators were used: 1. Measuring Tank 2. Digital Stop Watch 3. Digital Pressure All master calibrators were found to be within the calibration validity on the date of calibration test.
Is(are) calibration(s) valid for the whole reporting period?	Yes. As discussed above, the calibration certificates cover the complete monitoring period and there is no gap in the calibration.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, The calibration is valid for the entire measuring range.
How were the values in the monitoring report verified?	The flue gas volume data is recorded in the logbook of each WHRB on hourly basis. The data is also electronically generated by the Distributed Control System (DCS) in the form of daily electrical and production log sheets /32/. Since the electronic sheets were found to be more reliable, therefore

	<p>complete set of monthly summary of the electrical and production sheets were checked to verify the data which were also cross checked with the DCS records during site visit. The data in logbooks was also verified on the basis of random sampling.</p> <p>The value of the parameter reported in the Monitoring Report represents the cumulative reading for the complete monitoring period which is multiplied by density of waste flue gas to obtain the mass quantity of the waste flue gas. The density is mentioned in section D.1 of MR and found consistent with registered PDD.</p> <p>The verified value for the parameter is 1,695,284,966 kgs (1,255,085,833 Nm3) for monitoring period</p>
If applicable, has the reported data been cross-checked with other available data?	Yes, The data was checked from the daily records
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data is recorded in DCS log books and also transferred online to another computer from DCS. From this online data / DCS data, this is transferred to the excel sheets used for calculation of emission reduction and necessary QA/QC processes are in place.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable for this monitoring period as the complete set of data is available for this parameter.

3.5.2 Data/Parameter, Unit: Quantity of electricity supplied to the recipient plants by generator during the year y, **EG_{i,j,y} (MWh/Yr)**

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	<p>Measurement is continuous, recorded hourly and reported daily.</p> <p>As per the registered PDD, the parameter was calculated by deducting auxiliary consumption (metered by "Me2" which is sum of readings of "Me2A", "Me2B", "Me2D" sub-meters) from the gross electricity generation (metered by Me1).</p> <p>However, to account for transformer losses and electricity imports, the monitoring approach has been revised during the current verification as per the provisions of post registration changes (PS Version 7,</p> <p>The quantity of electricity supplied to the recipient facility is calculated by sum of metered values of in-house electricity consumption of LMEL processing plant ("Me3A" and "Me3B" meters, collectively referred as "Me3") and the net electricity exported to</p>

	<p>PTC ('Me4' Meter Export Reading – 'Me4' import Readings).</p> <p>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 was verified during the site visit and found to be complying with the registered monitoring plan.</p> <ul style="list-style-type: none"> Gross generation "EG_{gross}" is metered by "Me1" Auxiliary consumption "EG_{Auxiliary}" is metered by "Me2" which is sum of readings of "Me2A", "Me2B", "Me2D" sub-meters.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	<p>Me1- Generation end. Make – SEMS, 0.2 S</p> <p>Me2 – Auxiliary consumption , Me2A, Me2B, Me2C (Not installed), Me2D (Collectively referred as "Me2")</p> <p>Me4 – Export meter</p> <p>Me3 – In house consumption meter, Me3A and Me3B</p> <p>During site visit, the verification team observed that the meter 'Me2C' is not installed on the project site and the complete auxiliary load is distributed on other three meters. As per discussion with the PP, the meter 'Me2C' may be installed later depending on the technical requirement.</p>
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of all instruments were found to be +/- 0.2%. This was verified from the calibration certificates of all the energy meters /22/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, calibration & accuracy is valid for the entire measuring range.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	<p>Yes, the calibration interval is 1 year for 'Me1', 'Me2' and 'Me3' (Me3A and Me3B collectively) meters which is in line with the monitoring plan /38/ and the methodology. The calibration interval for 'Me4' meter is revised to 3 years as per the PDD Version 11 which is submitted along with this verification. The same is found to be in-line with the methodology and discussed in section 3.4 of this verification report. The calibration of 'Me4' was performed on 11/01/2012 which covers the complete monitoring period.</p>

Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes, The calibration of 'Me1', 'Me2' and 'Me3' energy meters is performed by an accredited lab by NABL /22/. Since the Me4 meter is not controlled by the PP, the calibration of energy meter Me4 is performed by Testing & Quality Assurance Lab, MSEDCL Nagpur which is NABL Accredited /22/.
Is(are) calibration(s) valid for the whole reporting period?	<p>The calibration of 'Me1', 'Me2' and 'Me3' energy meters is performed with a periodicity of less than a year with a validity of 1 year from the date of calibration.</p> <p>The energy meter Me4 is not controlled by the PP, the calibration of energy meter Me4 is performed by Testing & Quality Assurance Lab, MSEDCL Nagpur /22/. Hence, the change in calibration frequency for Me4 from 'annually' to 'once in 3 years' is proposed by the PP and processed along with this verification. Please refer section 3.4 for details.</p> <p>The calibration of 'Me4' was performed on 11/01/2012 which covers the complete monitoring period.</p>
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Calibration is valid for entire measuring range as checked from the calibration reports. /22/
How were the values in the monitoring report verified?	<p>The values were verified from the daily electrical log sheets maintained for all energy meters by the monitoring team. /31/</p> <p>The hourly meter readings are recorded in the DCS as well as log sheets maintained by the monitoring team. The daily meter readings are checked and approved for consistency by the plant manager.</p> <p>The verified value for the parameter is 142,582.86 MWh for monitoring period.</p>
If applicable, has the reported data been cross-checked with other available data?	The reported data was cross-checked from DCS data & Energy meter totalizer readings.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The monitored data is recorded in DCS and from DCS the data is taken to another computer to be saved in monthly sheets. From these daily/monthly sheets it is transferred to summary sheet to calculate emission reductions.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable for this monitoring period as the complete set of data is available for this parameter.

3.5.3 Data/Parameter, Unit: Quantity of electricity supplied to recipient facilities (i.e. LMEL and Power Trading Company) by the project activity during the year y, **EG_{j,y} (MWh)**

Criteria/Requirements	Assessment/Observation
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Measuring /Reading /Recording frequency	<p>The parameter represents the amount of electricity supplied to the recipient plants by WHRBs of the project activity. Since the project activity is runs both WHRBs and the fossil fuel based boiler simultaneously, the parameter is determined by multiplying the fraction of total energy which is generated by WHRBs with the total electricity supplied to the recipient facilities.</p> <p>The parameter is recorded daily and is calculated by using formula $EG_{j,y} = f_{wcm} \times EG_{i,j,y}$.</p>
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	Since it is a calculated parameter based on other monitoring parameters reported in the monitoring report, there is no monitoring equipment associated with this monitoring parameter.
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Not Applicable
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not Applicable
Calibration frequency /interval:	Not Applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Not Applicable
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not Applicable
Is(are) calibration(s) valid for the whole reporting period?	Not Applicable
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not Applicable
How were the values in the monitoring report verified?	<p>$EG_{j,y}$ is calculated and recorded daily by multiplying the monitoring parameter, $EG_{i,j,y}$ and the non-monitoring parameter, f_{wcm}. The parameter f_{wcm} is calculated by using formula:</p> $f_{wcm} = ST_{whr,y} / ST_{whr,y} + ST_{other,y}$

	<p>$ST_{whr,y}$ = energy content of the steam generated by all the WHRBs which is fed into turbine via common steam header</p> <p>$ST_{other,y}$ = energy content of the steam generated by other Fluidized Bed Combustion (FBC) coal based boiler which is fed into turbine via common steam header</p> <p>$ST_{whr,y}$ and $ST_{other,y}$ are reported as monitoring parameters and the frequency of recording for calculation purpose is daily.</p> <p>The verified value for the parameter is 95202.32069 MWh for monitoring period.</p>
If applicable, has the reported data been cross-checked with other available data?	The readings of monitoring parameters are also continuously recorded in the DCS. The reported data was cross-checked with DCS data to confirm the accuracy. It was found to be accurate.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Since it is a calculated parameter based on other monitoring parameters reported in the monitoring report, the robustness of data management is discussed in the respective monitoring parameter section, namely, 3.5.2.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such deviation identified.

3.5.4 Data/Parameter, Unit: 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, **EG_{export,y} (MWh)**

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	<p>The parameter represents the sum of electricity consumed by the process facility and the surplus electricity supplied to the power trading company.</p> <p>The parameter is measured continuously and recorded hourly.</p>
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	<p>Me3A and Me3B – Energy Meter for in-house electricity consumption in process facility</p> <p>Type:- Alpha M++</p> <p>Make:- Elster</p> <p>S/N – 05013487 & 05013488</p> <p>Me4 – Export Energy Meter for surplus electricity supplied to power trading company</p> <p>Type:- Alpha M++</p>

	Make:- Elster
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	<p>The registered PDD describes the accuracy class of all energy meters, including 'Me3' and 'Me4', as 0.2 S.</p> <p>The accuracy class of all meters, Me3A, Me3B and Me4, was checked through physical inspection as well as from the calibration/testing certificates of the meters /22/. The accuracy class was confirmed to be 0.2 S from the sources.</p> <p>Accuracy : 0.2%</p>
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy of calibrated equipment is valid for entire measuring range.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	<p>Yes, the calibration interval is 1 year for 'Me3A' and 'ME3B' meter which is in line with the monitoring plan and the methodology. The calibration interval for 'Me4' meter is revised to 3 years as per the PDD Version 11 which is submitted along with this verification. The same is found to be in-line with the methodology and discussed in section 3.4 of this verification report.</p> <p>The calibration of 'Me4' was performed on 11/01/2012 which covers the complete monitoring period.</p>
Is the calibration of measuring equipment carried out by an accredited person or institution?	The calibration of 'Me1', 'Me2' and 'Me3' energy meters is performed by Shri Krishna laboratories & Power Services which is accredited by NABL /22/. Since the Me4 meter is not controlled by the PP, the calibration of energy meter 'Me4' is performed by Testing & Quality Assurance Lab, MSEDCL Nagpur which is NABL Accredited /22/.
Is(are) calibration(s) valid for the whole reporting period?	<p>The calibration of 'Me1', 'Me2' and 'Me3' energy meters is performed with a periodicity of less than a year with a validity of 1 year from the date of calibration.</p> <p>The energy meter Me4 is not controlled by the PP, the calibration of energy meter Me4 is performed by Testing & Quality Assurance Lab, MSEDCL Nagpur /22/. Hence, the change in calibration frequency for Me4 from 'annually' to 'once in 3 years' is proposed by the PP and processed along with this verification. Please refer section 3.4 for details.</p> <p>The calibration of 'Me4' was performed on 11/01/2012 which covers the complete monitoring period.</p>
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, calibration is valid for entire measuring range

How were the values in the monitoring report verified?	<p>The values were verified from the daily log sheets maintained for all energy meters by the monitoring team.</p> <p>The hourly meter readings are recorded in the DCS as well as log sheets maintained by the monitoring team. The daily meter readings are checked and approved for consistency by the plant manager.</p> <p>The verified value for the parameter is 142,582.86 MWh for monitoring period.</p>
If applicable, has the reported data been cross-checked with other available data?	<p>The reported data was cross-checked from DCS data & Energy meter totalizer readings.</p> <p>Energy Meter "Me4" value was cross checked with official MSEDCL meter which is used for billing.</p>
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	<p>The monitored data is recorded in DCS and from DCS the data is taken to another computer to be saved in monthly sheets. From these daily/monthly sheets it is transferred to summary sheet to calculate emission reductions.</p>
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	<p>Not applicable as complete set of data was made available to verification team.</p>

3.5.5 Data/Parameter, Unit: Quantity of steam from WHRB used for electricity generation, $Q_{whr,steam}$ (tonnes/hr)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	<p>The parameter represents the total quantity of steam generated by all WHRBs obtained from individual measurement of each WHRB.</p> <p>The steam quantity for each WHRB is continuously measured and recorded on hourly basis. The hourly total steam quantity is calculated by adding the hourly steam values of all 5 WHRBs.</p>
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	<p>The steam quantity measurement for each WHRB is performed through dedicated steam flow-meter installed at each WHR boiler. The details are given below:</p> <p>WHRB 1 Main Steam Flow – B1_FT_102</p> <p>WHRB 2 Main Steam Flow – B2_FT_102</p> <p>WHRB 3 Main Steam Flow – B3_FT_102</p> <p>WHRB 4 Main Steam Flow – B4_FT_102</p>

	WHRB 5 Main Steam Flow – B5_FT_102 Make – Yokogawa (All meters)
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of each steam flow meter was verified through physical inspection as well as calibration certificate and was found to be +/- 0.075% /20/. The registered PDD has mentioned the accuracy class as 0.2%. Since the higher accuracy of the installed meters does not raise any risk related to accuracy and conservativeness of the emission reduction calculations, it was accepted by the verification team.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy of instrument used is valid for entire measuring range.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes, the monitoring plan of the registered PDD mentions the frequency of the steam flow meters as annual.
Is the calibration of measuring equipment carried out by an accredited person or institution?	All the WHRB steam flow-meters are calibrated by Bhilai Calibration Laboratory, Bhilai which is accredited by NABL. /20/
Is(are) calibration(s) valid for the whole reporting period?	No gap in calibration
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration is valid for the entire measuring range
How were the values in the monitoring report verified?	The values were verified from the daily production log sheets maintained for all WHRBs by the monitoring team. The hourly meter readings are recorded in the DCS as well as log sheets maintained by the monitoring team. The daily meter readings are checked and approved for consistency by the plant manager. The verified value of the parameter is 479,064.3 tonnes of steam for the monitoring period.
If applicable, has the reported data been cross-checked with other available data?	The reported data was cross-checked from DCS data which was available online. /41/
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The monitored data is recorded in DCS and from DCS the data is taken to another computer to be saved in monthly sheets. From these daily/monthly sheets it is transferred to summary sheet to calculate emission reductions.

In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable as complete set of data was made available to verification team.
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3.5.6 Data/Parameter, Unit: Quantity of steam from other boilers used for electricity generation, $Q_{othersteam, (FBC \text{ Steam})}$ (tonnes/hour)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The parameter represents the quantity of steam generated by the coal based FBC boiler using online steam flow-meter. The parameter is continuously measured and recorded on hourly basis.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	AFBC main Steam Flow – FT_1102 Make – Yokogawa Accuracy - +/- 0.075%
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of the steam flow meter was verified through physical inspection as well as calibration certificate and was found to be +/- 0.075%. The registered PDD has mentioned the accuracy class as 0.2%. Since the higher accuracy of the installed meters does not raise any risk related to accuracy and conservativeness of the emission reduction calculations, it was accepted by the verification team.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy of instrument used is valid for entire measuring range.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes, the monitoring plan of registered PDD mentions calibration frequency as annual and also carried out annually.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The steam flow-meter is calibrated by Bhilai Calibration Laboratory, Bhilai which is accredited by NABL. /20.6/
Is(are) calibration(s) valid for the whole reporting period?	No gap in calibration
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, the calibration is valid for the entire measuring range.

How were the values in the monitoring report verified?	The values were verified from the daily production log sheets maintained for the AFBC boiler by the monitoring team. /32/ The verified value of the parameter is 241,091.2 tonnes of steam for monitoring period.
If applicable, has the reported data been cross-checked with other available data?	The hourly meter readings are recorded in the DCS as well as the production log sheets maintained by the monitoring team. The daily meter readings are checked and approved for consistency by the plant manager.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The reported data was cross-checked from DCS data which was available online. /41/
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable for this project activity

3.5.7 Data/Parameter, Unit: Energy content of Steam generated by WHRBs fed to turbine via common steam header, $ST_{whr,y}$ (TJ)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Energy content of steam generated by WHRBs is calculated by using measured value of steam generation and enthalpy from steam tables. The formula used is: $ST_{whr,y} = Q_{whr, steam} \times (\text{Enthalpy of steam} - \text{enthalpy of water})$ Since, the source parameter, $Q_{whr, steam}$ is measured on continuous basis, it can be concluded that the dependent parameter, $ST_{whr,y}$ is also monitored continuously. The recording frequency for $ST_{whr,y}$ is daily.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	Since it is a calculated parameter based on other monitoring parameters reported in the monitoring report, there is no monitoring equipment associated with this monitoring parameter.
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Not Applicable

Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not Applicable
Calibration frequency /interval:	Not Applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Not Applicable
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not Applicable
Is(are) calibration(s) valid for the whole reporting period?	Not Applicable
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not Applicable
How were the values in the monitoring report verified?	<p>The values for the parameter are verified from the daily production log sheets maintained by the monitoring team.</p> <p>Energy content of steam generated by WHRBs is calculated by using measured value of steam generation and enthalpy from steam tables. The formula used is:</p> $ST_{whr,y} = Q_{whr \text{ steam}} \times (\text{Enthalpy of steam} - \text{enthalpy of water})$ <p>The temperature and pressure of the outlet steam from each WHR Boiler is recorded on hourly basis. Enthalpy of steam via common header from WHR boilers is calculated on the basis of average steam pressure and temperature of the day at the common header. The following web-link is used for steam enthalpy calculations. http://www2.spiraxsarco.com/resources/steam-tables/superheated-steam.asp</p> <p>The energy content of the steam generated by WHRBs for the complete monitoring period is obtained by calculating from the monthly average value which is derived from the daily average values for the respective month.</p> <p>Similarly, feed water enthalpy is calculated on the basis of average feed water temperature of the day. http://www2.spiraxsarco.com/resources/steam-tables/saturated-water.asp</p> <p>Net Enthalpy of steam fed to turbine from the WHR boilers is calculated by taking the difference of</p>

	enthalpy of steam and the enthalpy of feed water for the complete monitoring period. The verified value of the parameter is 1374.37 TJ for monitoring period.
If applicable, has the reported data been cross-checked with other available data?	The reported values of enthalpy were cross-checked for consistency on random basis from the web-link http://www2.spiraxsarco.com/resources/steam-tables/superheated-steam.asp . http://www2.spiraxsarco.com/resources/steam-tables/saturated-water.asp
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The data is daily reported in the daily production log sheets, from where it is transferred to the ER calculation spreadsheet. The transfer of data was found to be consistent.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable as complete set of values are reported for the parameter.

3.5.8 Data/Parameter, Unit: Energy content of Steam generated by FBC fed to turbine via common steam header, **ST_{other,y} (TJ)**

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Energy content of steam generated by Atmospheric Fluidized Bed Combustion (AFBC) boiler is calculated by using measured value of steam generation and enthalpy from steam tables. The formula used is: $ST_{other,y} = Q_{other\ steam\ (FBS\ Steam)} \times (Enthalpy\ of\ steam - enthalpy\ of\ water)$ Since, the source parameter, $Q_{other\ steam\ (FBS\ Steam)}$ is measured on continuous basis, it can be concluded that the dependent parameter, $ST_{other,y}$ is also monitored continuously. The recording frequency for $ST_{other,y}$ is daily.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	Since it is a calculated parameter based on other monitoring parameters reported in the monitoring report, there is no monitoring equipment associated with this parameter.

Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Not Applicable
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not Applicable
Calibration frequency /interval:	Not Applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Not Applicable
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not Applicable
Is(are) calibration(s) valid for the whole reporting period?	Not Applicable
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not Applicable
How were the values in the monitoring report verified?	<p>The values for the parameter are verified from the daily production log sheets maintained by the monitoring team.</p> <p>Energy content of steam generated by AFBC boiler is calculated by using measured value of steam generation and enthalpy from steam tables. The formula used is:</p> $ST_{other,y} = Q_{other\ steam} (FBS\ Steam) \times (Enthalpy\ of\ steam - enthalpy\ of\ water)$ <p>The temperature and pressure of the outlet steam from AFBC Boiler is recorded on hourly basis. Enthalpy of steam via common header from the AFBC boiler is calculated on the basis of average steam pressure and temperature of the day at the common header. The following web-link is used for enthalpy calculations. http://www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp</p> <p>The energy content of the steam generated by AFBC boiler for the complete monitoring period is obtained by calculating from the monthly average value which is derived from the daily average values for the respective month.</p>

	<p>Similarly, feed water enthalpy is calculated on the basis of average feed water temperature of the day.</p> <p>http://www2.spiraxsarco.com/resources/steam-tables/saturated-water.asp</p> <p>Net Enthalpy of steam fed to turbine from the AFBC boiler is calculated by taking the difference of enthalpy of steam and the enthalpy of feed water.</p> <p>The verified value of the parameter is 684.00 TJ for monitoring period</p>
If applicable, has the reported data been cross-checked with other available data?	<p>The reported values of enthalpy were cross-checked for consistency on random basis from the web-link http://www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp.</p> <p>http://www2.spiraxsarco.com/resources/steam-tables/saturated-water.asp</p>
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The data is daily reported in the daily production log sheets, from where it is transferred to the ER calculation spreadsheet. The transfer of data was found to be consistent.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable as complete set of values are reported for the parameter.

3.5.9 Data/Parameter, Unit: Steam temperature at inlet to Steam turbine generator, $t_{whrsteam}$ / $t_{othersteam}$ (deg C)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Measurement is continuous and recorded hourly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	<p>The temperature of steam is monitored at the outlet of all steam boilers, including the AFBC and 5 WHR boilers by 'K' Type thermocouple having measuring range of 0-1200 degree Celsius.</p> <p>Type – Temperature Transmitter 'K' Type Thermocouple</p> <p>Make – ABB</p> <p>Equipment ID</p> <p>WHRB 1 Main Steam Temperature – B1_TE_406</p> <p>WHRB 2 Main Steam Temperature – B2_TE_406</p> <p>WHRB 3 Main Steam Temperature – B3_TE_406</p> <p>WHRB 4 Main Steam Temperature – B4_TE_406</p>

	WHRB 5 Main Steam Temperature – B5_TE_406 AFBC Main Steam Temperature – TT_1108 Accuracy Class (All thermocouples) – 0.075%
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of all thermocouples for measuring steam temperature was verified through physical inspection as well as calibration certificate and was found to be +/- 0.075%.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy of instrument used is valid for entire measuring range.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes, the monitoring plan of registered PDD mentions the frequency of calibration as annual.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The thermocouple for measurement of steam temperature are calibrated by Bhilai Calibration Laboratory, Bhilai which is accredited by NABL. /18/
Is(are) calibration(s) valid for the whole reporting period?	No gap in calibration observed
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Calibration is valid for entire range of measurement.
How were the values in the monitoring report verified?	<p>Hourly data is recorded in the daily production log sheets by the monitoring team. The daily average values are recorded in the same sheet on completion of the day. 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. The daily electronic logsheets were checked to verify the consistency of the ER sheet.</p> <p>The verified value of the parameter is 480.28⁰ C for monitoring period.</p>
If applicable, has the reported data been cross-checked with other available data?	Apart from manual log sheets, data is also recorded in electronic spreadsheets with DCS. The DCS records were cross-checked and the log sheet data was found to be consistent.

Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Data recording was found to be correct and as per registered monitoring plan.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable

3.5.10 Data/Parameter, Unit: Steam pressure at inlet to STG, $P_{whrsteam}/P_{othersteam}$, (kg/cm² abs)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The parameter represents the pressure measured at the common steam header connected to the inlet of the Steam Turbine. Measurement is continuous and recording frequency is hourly.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	Digital Pressure Transmitter with indicator Make (All Meters) – Yokogawa Equipment ID AFBC Main Steam Pressure – PT_1101 WHRB 1 Main Steam Pressure – B1_PT_202 WHRB 2 Main Steam Pressure – B2_PT_202 WHRB 3 Main Steam Pressure – B3_PT_202 WHRB 4 Main Steam Pressure – B4_PT_202 WHRB 5 Main Steam Pressure – B5_PT_202 Accuracy Class (All Meters) – 0.075%
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of all Pressure transmitters for measuring steam pressure was verified through physical inspection as well as calibration certificate and was found to be +/- 0.075%.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy of instrument used is valid for entire measuring range.
Calibration frequency /interval:	Annual

Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes, the monitoring plan of registered PDD mentions the frequency of calibration as annual.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The pressure transmitter for measurement of steam pressure are calibrated by Bhilai Calibration Laboratory, Bhilai which is accredited by NABL. /23/
Is(are) calibration(s) valid for the whole reporting period?	No gap in calibration observed
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Calibration is valid for the entire range of measurement.
How were the values in the monitoring report verified?	Hourly data is recorded in the daily production log sheets by the monitoring team. The daily average values are recorded in the same sheet on completion of the day, which is finally used to determine enthalpy of the daily cumulative steam. The annual average value is reported in the ER sheet and MR. The verified value for the parameter is 62.10 Kg/cm ² abs for monitoring period
If applicable, has the reported data been cross-checked with other available data?	Apart from manual log sheets, data is also recorded in electronic spreadsheets with DCS. The DCS records were cross-checked and the log sheet data was found to be consistent.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Data recording was found to be correct and as per registered monitoring plan.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable

3.5.11 Data/Parameter, Unit: Boiler feed water temperature at all boilers, T_{BFW} (Deg C)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Measurement: Continuous Recording: Hourly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	Temperature Transmitter 'K' Type Thermocouple Make – ABB

	Turbine Feed Water Temperature – TT_001 Accuracy Class – +/- 0.075%
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of all thermocouples for measuring steam pressure was verified through physical inspection as well as calibration certificate and was found to be +/- 0.075%.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy of instrument used is valid for entire measuring range.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes, the monitoring plan of registered PDD mentions the frequency of calibration as annual.
Is the calibration of measuring equipment carried out by an accredited person or institution?	The thermocouples for measurement of steam temperature are calibrated by Bhilai Calibration Laboratory, Bhilai which is accredited by NABL. /24/
Is(are) calibration(s) valid for the whole reporting period?	No gap in calibration observed
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Calibration is valid for the entire range of measurement.
How were the values in the monitoring report verified?	Hourly data is recorded in the daily production log sheets by the monitoring team. The daily average values are recorded in the same sheet on completion of the day, which is finally used to determine feed water enthalpy of the daily cumulative steam. The verified value of the parameter is 119.89 ⁰ C for monitoring period.
If applicable, has the reported data been cross-checked with other available data?	Apart from manual log sheets, data is also recorded in electronic spreadsheets with DCS. The DCS records were cross-checked and the log sheet data was found to be consistent.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Data recording was found to be correct and as per registered monitoring plan.

In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable
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3.5.12 Data/Parameter, Unit: WECM (Flue gas) temperature at WHR boilers inlet, $t_{wcm,h}$ (Deg C)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Measurement: Continuous Recording: Hourly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	Temperature Transmitter 'K' Type Thermocouple Make – ABB Equipment ID AFBC Furnace Temperature – TE_1214 WHRB 1 Flue Gas Temperature – B1_TE_501 WHRB 2 Flue Gas Temperature – B2_TE_501 WHRB 3 Flue Gas Temperature – B3_TE_501 WHRB 4 Flue Gas Temperature – B4_TE_501 WHRB 5 Flue Gas Temperature – B5_TE_501 Accuracy Class – +/- 0.075%
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of all thermocouples for measuring flue gas temperature was verified calibration certificate and was found to be +/- 0.075%.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes, accuracy of instrument used is valid for entire measuring range. The same temperature transmitters are used for the entire monitoring period and hence the accuracy is valid for the entire period.
Calibration frequency /interval:	Annual
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes, the monitoring plan of registered PDD mentions the frequency of calibration as annual.

Is the calibration of measuring equipment carried out by an accredited person or institution?	The thermocouples for measurement of flue gas temperature are calibrated by Bhilai Calibration Laboratory, Bhilai which is accredited by NABL. /25/
Is(are) calibration(s) valid for the whole reporting period?	No gap in calibration observed
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Calibration is valid for the entire range of measurement.
How were the values in the monitoring report verified?	Hourly data is recorded in the daily production log sheets by the monitoring team. The daily average values are recorded in the same sheet on completion of the day, which is finally used to determine the energy contained in the flue gas. The verified value of the parameter is 821.10 ⁰ C which is the average value for the whole monitoring period.
If applicable, has the reported data been cross-checked with other available data?	Apart from manual log sheets, data is also recorded in electronic spreadsheets with DCS. The DCS records were cross-checked and the log sheet data was found to be consistent.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Data recording was found to be correct and as per registered monitoring plan.
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable

3.5.13 Data/Parameter, Unit: Fraction of total electricity generated by the project activity that is supplied to the recipients, **F_{j,y} (%)**

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	Calculated in % from plant records for LMEL process facility and supply to power trading company. Source Data is measured using energy meters on continuous basis and recorded on hourly basis.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Monitoring equipment	Calculated from cumulative electricity supplied to the recipient facility as fraction of the total electricity supplied to all recipient facilities.

Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Not applicable
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not applicable
Calibration frequency /interval:	Not applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Not applicable
Is the calibration of measuring equipment carried out by an accredited person or institution?	Not applicable
Is(are) calibration(s) valid for the whole reporting period?	Not applicable
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not applicable
How were the values in the monitoring report verified?	<p>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.</p> <p>The verified value of the parameter is:</p> <ol style="list-style-type: none"> 1) For LMEL facility = 15.49% 2) Export to Power Trading Company = 84.51%
If applicable, has the reported data been cross-checked with other available data?	Plant records were checked for the calculation.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Data reporting was as per registered monitoring plan. The transfer of data is correct as no error was reported in transfer of data.

In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	Not applicable
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3.6 Data not monitored (ex ante or external parameters)

3.6.1 Data/Parameter, Unit: The CO₂ emission factor for the grid displaced due to project activity, during year y. **EF_{Elec,i,j,y}, tCO₂/MWh**

What is the value applied?	0.8032
How it was checked and is it correctly applied?	The value reported in MR was consistent with the registered PDD. The calculations and the input value reported in section B.6.2 of Registered PDD were checked with the source data and found to be consistent. /17,30/

3.6.2 Data/Parameter, Unit: Average quantity of WECM, QWCM,BL, NM₃/year

What is the value applied?	1,067,921,600
How it was checked and is it correctly applied?	The value reported in MR was consistent with the corresponding ER spreadsheet of Registered PDD

3.6.3 Data/Parameter, Unit: Production of Sponge Iron in industrial facility, Q_{BL,product}, tonnes/year

What is the value applied?	185,493
How it was checked and is it correctly applied?	The value reported in MR was consistent with the Registered PDD

3.6.4 Data/Parameter, Unit: Specific waste energy production per tonne of sponge iron manufactured, q_{wcm, product}, NM₃/tonne

What is the value applied?	6240 Nm ³ /tonne – for 4X100 TPD Kiln 5280 Nm ³ /tonne – for 500 TPD Kiln
How it was checked and is it correctly applied?	The value reported in MR was consistent with the Registered PDD

3.6.5 Data/Parameter, Unit: Density of WECM, d wcm,BL, Kg/Nm³

What is the value applied?	1.335 for 100TPD kiln & 1.3649 for 500 TPD kiln.
How it was checked and is it correctly applied?	The value reported in MR was consistent with the section B.6.2 of Registered PDD

3.7 Assessment of data and calculation of emission reductions

All data were available on the site for the monitoring period from 27/05/2013 to 30/06/2014. The complete data was checked by the verification team. All parameters were monitored as per registered monitoring plan. However, during the verification post registration changes were identified relating to monitoring plan and it is confirmed that the final MR complies with the provisions indicated in the revised PDD.

Information provided in MR were checked in spreadsheet and cross verified from DCS data stored in the computer and also from the hard copies of DCS data.

The following equations were used, which are compliant to the applied methodology, ACM0012 Version 4.0.0:

Equation No. 3 of ACM0012 Version 4.0.0:

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

Where:

$BE_{elec,y}$ = Baseline emissions due to displacement of electricity during the year y (tCO₂)

$EG_{i,j,y}$ = The quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been sourced from source i (the grid or an identified source) during the year y in MWh

$EF_{elec,i,j,y}$ = The CO₂ emission factor for the electricity source i (gr for the grid, and is for an identified source), displaced due to the project activity, during the year y (tCO₂/MWh)

f_{wcm} = Fraction of total electricity generated by the project activity using waste energy. This fraction is 1 if the electricity generation is purely from use of waste energy. Depending upon the situation, this factor is estimated using the equations in section 3.1

f_{cap} = Factor that determines the energy that would have been produced in project year y using waste energy generated at a historical level, expressed as a fraction of the total energy produced using waste source in year y. The ratio is 1 if the waste energy generated in project year y is the same or less than that generated at a historical level.

Equation No. 38 of ACM0012 Version 4.0.0: $f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}}$

$Q_{WCM,BL}$ = 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

Equation No. 39 of ACM0012 Version 4.0.0: $f_{WCM} = \frac{ST_{whr,y}}{ST_{whr,y} + ST_{other,y}}$

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

The appropriateness of the input values and the application of the above mentioned equations were reviewed and verified by the verification team.

In the monitoring report Version 0, the parameter $EG_{i,j,y}$, was calculated as the difference of metered values of gross electricity generation and auxiliary consumption of power plant. i.e. $EG_{gross} - EG_{Auxiliary}$. During on-site inspection, the same was also cross checked from the sum of export electricity metered by energy meter "Me4" and in house consumption electricity meter "Me3". Due to transformer losses, the cross-check approach (sum of "Me3" and "Me4" meters) was found to be more

conservative. Therefore, the verification team accepted the sum of energy meters “Me3” and “Me4” as the value of parameter $EG_{i,j,y}$ and the same is used to calculate the emission reduction.

The verification team confirms that

- a) A complete set of data for the specified monitoring period was available;
- b) The information provided in the monitoring report and corresponding spreadsheet has been cross checked and reported under Section 3.5, among others;
- c) The assessment team confirms that the formulae for calculating baseline emissions are in accordance with registered PDD, revised monitoring plan and applied methodology. There were no project emissions and leakage to be considered.
- d) The assumptions/emission factors used in emission calculations have been correctly applied and justified.

3.8 Quality of evidence to determine emission reductions

There is an audit trail that contains the evidence and records that validate the stated figures. There is sufficient evidence available as data is recorded from DCS and from DCS to another computer daily. The hourly and daily data are available for verifications. The verification team checked complete data from DCS records. The data covers whole monitoring period from 27/05/2013 to 30/06/2014. The monitoring report data was cross-checked with DCS records for steam and temperature and energy meter data were also checked from DCS records. The export data was also cross checked from the MSEDCL records as well. The stated figures are correct.

It is confirmed that the source documents that form the basis for assumptions and other information underlying the GHG data are included in the report.

3.9 Management system and quality assurance

The responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the registered monitoring plan. The site is ISO 9001 & ISO 14001 certified site so QA/QC procedures are in place /13,14/. Shift engineers (Operations) are responsible for hourly data recording. Electrical shift engineer is responsible for Energy meter readings of Me1, Me2, Me3 and Me4 respectively. Maintenance of meters is the responsibility of Mechanical shift engineer. Plant manager is responsible for calibration of all measuring instruments used in the project activity. CDM officer is responsible for preparation of required documentation, reviewing the accuracy of reports and also responsible for internal audits of the data and achieving of data monthly /15/. It was also verified by the assessment team that all the staff members at the project site were provided adequate training in all aspects of the operations /26/.

4. REFERENCES

S. No.	Title of Document	Version	Date
1	Registered PDD	9	10/05/2013
2	Validation Report	2	21/05/2013
3	ACM0012 – Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects	04.0.0	15/04/2011
4	Monitoring Report (publication)	0	06/08/2014
5	Monitoring Report (final)	4	10/08/2015
6	ER spreadsheet (corresponding to final MR)	-	-
7	Certificate for use of Boiler – Registration number of Boiler MR/14567, WHRB-1	-	02/06/2014
8	Certificate for use of Boiler – Registration number of Boiler MR/14568, WHRB-2	-	23/06/2014
9	Certificate for use of Boiler – Registration number of Boiler MR/14874, WHRB-3	-	02/06/2014
10	Certificate for use of Boiler- Registration number of Boiler MR/14875, WHRB-4	-	23/06/2014
11	Certificate for use of Boiler- Registration number of Boiler MR/14703, WHRB-5	-	15/05/2014
12	Certificate for use of Boiler- Registration number of Boiler MR/14979, AFBC	-	01/04/2014
13	ISO 14001: 2004 certificate valid from 7th October 2012 to 12th July 2015	-	07/10/2012
14	ISO 9001: 2008 certificate valid from 21 May 2013 to 17 May 2016	-	21/05/2013
15	Internal Audit reports for the monitoring period from 27/05/2013 to 30/06/2014	-	03/06/2014
16	Commissioning and Synchronization of power plant with the regional grid for injection of electricity by Maharashtra State Electricity Transmission Company Limited (MSETCL)	-	18/12/2010
17	Tool to calculate the emission factor for an electricity system	2.2.1	29/09/2011
18	Calibration of temperature thermocouple at WHRB – 1 for Steam Temperature by Bhilai Calibration Laboratory Calibration of temperature thermocouple at WHRB – 2 for Steam Temperature by Bhilai Calibration Laboratory Calibration of temperature thermocouple at WHRB – 3 for Steam Temperature by Bhilai Calibration Laboratory Calibration of temperature thermocouple at WHRB – 4 for Steam Temperature by Bhilai Calibration Laboratory Calibration of temperature thermocouple at WHRB – 5 for Steam Temperature by Bhilai Calibration Laboratory	-	26/04/2013, 25/04/2014 26/04/2013, 25/04/2014 26/04/2013, 25/04/2014 26/04/2013, 25/04/2014 26/04/2013, 25/04/2014

	Calibration of temperature thermocouple at AFBC Boiler for Steam Temperature by Bhilai Calibration Laboratory		26/04/2013, 25/04/2014
19	Calibration of pressure transmitter at WHRB – 1 for Steam Pressure by Bhilai Calibration Laboratory Calibration of pressure transmitter at WHRB – 2 for Steam Pressure by Bhilai Calibration Laboratory Calibration of pressure transmitter at WHRB – 3 for Steam Pressure by Bhilai Calibration Laboratory Calibration of pressure transmitter at WHRB – 4 for Steam Pressure by Bhilai Calibration Laboratory Calibration of pressure transmitter at WHRB – 5 for Steam Pressure by Bhilai Calibration Laboratory Calibration of pressure transmitter at AFBC boiler for Steam Pressure by Bhilai Calibration Laboratory	-	25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014
20	/20.1/ Calibration of Steam Flow Meter at WHRB – 1 by Bhilai Calibration Laboratory /20.2/ Calibration of Steam Flow Meter at WHRB – 2 by Bhilai Calibration Laboratory /20.3/ Calibration of Steam Flow Meter at WHRB – 3 by Bhilai Calibration Laboratory /20.4/ Calibration of Steam Flow Meter at WHRB – 4 by Bhilai Calibration Laboratory /20.5/ Calibration of Steam Flow Meter at WHRB – 5 by Bhilai Calibration Laboratory /20.6/ Calibration of Steam Flow Meter at AFBC boiler by Bhilai Calibration Laboratory	-	25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014 25/04/2013, 25/04/2014
21	Calibration of Ultrasonic Gas Flowmeter at WHRB – 1 by Arrow Instrument Calibration Calibration of Ultrasonic Gas Flowmeter at WHRB – 2 by Arrow Instrument Calibration Calibration of Ultrasonic Gas Flowmeter at WHRB – 3 by Arrow Instrument Calibration Calibration of Ultrasonic Gas Flowmeter at WHRB – 4 by Arrow Instrument Calibration Calibration of Ultrasonic Gas Flowmeter at WHRB – 5 by Arrow Instrument Calibration	-	20/04/2013, 19/04/2014 20/04/2013, 19/04/2014 20/04/2013, 19/04/2014 20/04/2013, 19/04/2014 20/04/2013, 19/04/2014
22	/22.1/ Calibration of Energy meter Me1 by Shri Krishna Laboratories & Power Services Calibration of Energy meter Me1 by MSEDCL /22.2/ Calibration of Energy meter Me2A by Shri Krishna Laboratories & Power Services Calibration of Energy meter Me2A by MSEDCL /22.3/ Calibration of Energy meter Me2B by Shri Krishna Laboratories & Power Services Calibration of Energy meter Me2B by MSEDCL	-	06/12/2012, 08/10/2013 12/08/2014 06/12/2012, 08/10/2013 25/08/2014 06/12/2012, 08/10/2013 25/08/2014

	/22.4/ Calibration of Energy meter Me2D by Shri Krishna Laboratories & Power Services Calibration of Energy meter Me2D by MSEDCL /22.5/ Calibration of Energy meter Me3A by Shri Krishna Laboratories & Power Services Calibration of Energy meter Me3A by MSEDCL /22.6/ Calibration of Energy meter Me3B by Shri Krishna Laboratories & Power Services Calibration of Energy meter Me3B by MSEDCL /22.7/ Testing Reports of Energy meter Me4 by Maharastra State Electricity Transmission Co. Ltd.		06/12/2012, 08/10/2013 25/08/2014 06/12/2012, 08/10/2013 25/08/2014 06/12/2012, 08/10/2013 25/08/2014 11/01/2012, 20/11/2013 09/04/2014
23	Calibration of Pressure Transmitter at Turbine TG Inlet by Bhilai Calibration Laboratory	-	25/04/2013, 25/04/2014
24	Calibration of Temperature thermocouple at Turbine Feed Water Temperature by Bhilai Calibration Laboratory	-	26/04/2013, 25/04/2014
25	Calibration of WHRB – 1 Flue Gas Temperature at Boiler Inlet by Bhilai Calibration Laboratory Calibration of WHRB – 2 Flue Gas Temperature at Boiler Inlet by Bhilai Calibration Laboratory Calibration of WHRB – 3 Flue Gas Temperature at Boiler Inlet by Bhilai Calibration Laboratory Calibration of WHRB – 4 Flue Gas Temperature at Boiler Inlet by Bhilai Calibration Laboratory Calibration of WHRB – 5 Flue Gas Temperature at Boiler Inlet by Bhilai Calibration Laboratory	-	26/04/2013, 25/04/2014 26/04/2013, 25/04/2014 26/04/2013, 25/04/2014 26/04/2013, 25/04/2014 26/04/2013, 25/04/2014
26	Training Record maintained by Lloyd metals and Engineers Limited for Calendar Year 2013 and 2014	-	-
27	CDM Project Standard	7	01/06/2014
28	CDM Project Cycle Procedure	7	01/06/2014
29	CDM Validation and Verification Standard	7	01/06/2014
30	CO2 Baseline Database for the Indian Power Sector issued by Central Electrical Authority (CEA), Ministry of Power Version 4	4	2008
31	Daily Electrical Logsheets containing hourly readings of all energy meters	-	-
32	Daily Production Logsheets containing hourly readings of all measurement related to waste gas and steam production	-	-

33	Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 issued by Central Electricity Authority	-	17/03/2006
34	Brochure for Alpha Plus energy meters from ELSTER http://www.raleighes.info/Support/Opt-Out_files/TM42-2182D_-_ALPHA_Plus.pdf	-	-
35	Certificate of Incorporation issued by Registrar of Companies, Maharashtra, Mumbai	-	25/04/2011
36	http://lloyds.in/driplant.html	-	-
37	Email submitted to CDM Registry of UNFCCC along with attached documents: - Revised MOC dated 09/06/2014 - Authorizing Letter from the DNA dated 19/05/2014 Follow-up Email submitted to CDM Registry of UNFCCC	-	22/09/2014 06/11/2014
38	Revised PDD Revised PDD	10 11	03/03/2015 10/08/2015
39	CDM Project Standard	9	20/02/2015
40	Log sheets reporting the monthly import of electricity from the grid via "Me4" meter for the monitoring period 27/05/2013 to 30/06/2014	-	27/05/2013 to 30/06/2014
41	Online Data available on DCS for the monitoring period 27/05/2013 to 30/06/2014		27/05/2013 to 30/06/2014

List of persons interviewed:

S. No.	Name	Designation	Organization	Date
1	R M Alegavi	Sr. Vice President Technology	Lloyds Steel Industries	29/09/2014
2	V K Pandey	CDM Officer	Lloyds Metals and Energy Limited	29/09/2014
3	Rajneesh Tripathi	Manager – Electrical	Lloyds Metals and Energy Limited	30/09/2014
4	Mahesh Hajare	Manager - Thermal	Lloyds Metals and Energy Limited	30/09/2014
5	H K Singh	Manager – Mechanical	Lloyds Metals and Energy Limited	30/09/2014

5. CERTIFICATION STATEMENT

Earthood Services Private Limited (Earthood), contracted by M/s Lloyds Metals and Energy Limited, has performed the independent validation of the post registration changes and the verification of the emission reductions for the CDM project activity 9003 "LMEL 25 MW Waste Heat based Captive Power Plant" in India for the monitoring period 27/05/2013 to 30/06/2014 as reported in the Monitoring Report (public) Version 0 dated 06/08/2014. The M/s Lloyds Metals and Energy Limited is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

Validation Statement for Post Registration Changes

The validation was performed on the basis of rules and requirements defined by UNFCCC for the CDM project activities. The review of the revised PDD, supporting documentation and the associated audit procedures (onsite visit and interviews) have provided Earthood with sufficient evidence to determine the fulfilment of stated criteria.

It is our opinion that the corrected information in the revised PDD, Version 11 dated 10/08/2015 is an accurate reflection of actual project information and the corrected parameters are in accordance with the applied methodology, the monitoring plan and/or the applied standardized baseline. Therefore, Earthood requests the acceptance of the post registration corrections in the registered CDM project activity.

Verification Statement for the monitoring period 27/05/2013 to 30/06/2014

Earthood commenced the verification on the basis of the baseline and monitoring methodology ACM0012 Version 04.0.0, the monitoring plan contained in the registered PDD Version 9 dated 10/05/2013, Monitoring Report (public) Version 0 dated 06/08/2014 as per the methodology described under Section 2 of this report. Earthood's verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. Earthood planned and performed the verification by obtaining evidence and other information and explanations that Earthood considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 27/05/2013 to 30/06/2014 are fairly stated in the Monitoring Report (final) Version 4 dated 10/08/2015. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0012 Version 04.0.0 and the monitoring plan contained in the PDD Version 11 dated 10/08/2015.

Earthood Services Private Limited is able to certify that the emission reductions from the CDM project activity 9003 "LMEL 25 MW Waste Heat based Captive Power Plant" in India during the period 27/05/2013 to 30/06/2014 (including both days) amount to 71,302 tCO₂e.

Verified and certified emission reductions as per commitment period:

Commitment period	Amount
Upto 31/12/2012 (1 st commitment period)	Not applicable/Nil
From 01/01/2013	71,302 tCO ₂ e



Kaviraj Singh

Managing Director

Earthood Services Private Limited

09/11/2015

Gurgaon, Haryana, India

6. FINDINGS (CAR/CL/FAR)

Type		Date	30/09/2014
CAR#01		Reference	Section D.2 of MR
Description of the Non Conformance			
In section D.2 of MR the parameter Qwhr steam - Calibration frequency not mentioned.			
1stResponse from PP		Date	09/10/2014
Revised MR in D.2 Qwhr steam - Calibration enclosed			
1st Assessment by Audit Team	Status	Closed	Date 14/11/2014
In section D.2 the parameter Q whr steam, mentions the calibration frequency as annual and calibration records provided were also checked and found to be in line for the entire monitoring period with no Gap in calibration. Closed.			

Type		Date	30/09/2014
CAR#02		Reference	Section D.2 of MR
Description of the Non Conformance			
In section D.2 of MR the parameter Qwcmv- not matching with registered PDD.			
1stResponse from PP		Date	09/10/2014
Revised MR in D.2 Qwcmv steam - Calibration. Matching with registered PDD.			
1st Assessment by Audit Team	Status	Closed	Date 14/11/2014
Revised MR checked and now parameter Qwcmv steam is now matching with registered PDD. Closed.			

Type		Date	30/09/2014
CAR#03		Reference	Section D.2 of MR
Description of the Non Conformance			
In section D.2 of MR the parameter Q whr & other is not calculated as per registered PDD.			
1stResponse from PP		Date	09/10/2014
Revised MR in D.2 Q whr & other is now calculated as per registered PDD.			
1st Assessment by Audit Team	Status	Closed	Date 14/11/2014
Revised MR & spreadsheet checked and now parameter Q whr & other is now matching with registered PDD. The change was in calculation of steam quantity by multiplying by density. The revised spreadsheet is checked and found corrected. Closed.			

Type		Date	30/09/2014
CAR#04		Reference	Section A.3 of MR
Description of the Non Conformance			
In section A.3 of MR the name of the entity got changed from Lloyds Metals & Engineers limited to Lloyds Metals & Energy Limited. This is not reflected in MR & UNFCCC website.			
1stResponse from PP		Date	09/10/2014

The name change is happened and we are submitting DNA approval, Revised MOC and mail submitted to UNFCCC.				
1st Assessment by Audit Team	Status	Closed	Date	14/11/2014
The name change was observed during site visit and the same was raised. Based on this the PP submitted revised DNA approval for name change of entity, Revised MOC & mail submitted to UNFCCC. Verification team also checked the Revised Certificate of incorporation as well and obtained the scanned copy of the same. Even the submission screen shot of September 2014 & November 2014 were also checked. These were checked and found OK. The name is still neither appearing on UNFCCC website nor acknowledged by UNFCCC by mail. Awaiting UNFCCC approval. The CAR is closed as per Certificate of incorporation as per companies act & Revised DNA approval. Closed.				

Type	Date	14/11/2014
CAR#05	Reference	MR
Description of the Non Conformance		
<div>1. The MR does not reflects the changes in the Make and Accuracy class of Temperature thermocouples.</div> <div>2. The MR also does not reflects the Change in accuracy class in Flowmeters</div>		
1 st Response from PP	Date	03/02/2015
The revised MR version 03 now mentions all the changes in section B.2 of MR. The Accuracy class of thermocouples and flowmeters is improved from 0.2% to 0.075% which is installed at present. The make of thermocouples is also changed to ABB.		
1 st Assessment by Audit Team	Status	Closed
	Date	12/03/2015
The Verification team checked the revised MR and PDD received from the PP and found that necessary corrections of Make and Accuracy class has been done. These corrections does not affect the CER calculations and hence does not require prior approval. The changes were found OK and hence CAR is closed.		

Type		Date	14/11/2014	
CAR#06		Reference	MR	
Description of the Non Conformance				
The monitoring parameter Fi,y “Fraction of total electricity generated by the project activity that is supplied to the recipients” does not include the details about the calculation approach for the parameter.				
1 st Response from PP		Date	03/02/2015	
The revised MR version 03 now mentions the details about the calculation approach both in revised PDD and MR.				
1 st Assessment by Audit Team	Status	Closed	Date	12/03/2015
The Verification team checked the revised MR and PDD received from the PP and found that the necessary calculation approach is mentioned now. The Calculation approach mentioned now does not affect the CER calculations as this is not used in CER calculation and hence does not require prior approval. The changes were found OK and hence CAR is closed.				

Type	Date	14/11/2014
CAR#07	Reference	Section B.1 & B.2 of MR
Description of the Non Conformance		

The Position of meter Me4 is wrongly mentioned in registered PDD and MR in section B.1 and not reported in section B.2				
1stResponse from PP			Date	03/02/2015
The revised MR version 03 now mentions the corrected position both in revised PDD and MR.				
1st Assessment by Audit Team	Status	Closed	Date	12/03/2015
The Verification team checked the revised MR and PDD received from the PP and found that the necessary correction has been done. The correction of meter place in MR and PDD mentioned now does not affect the CER calculations as this is just a correction of position only and hence does not require prior approval. The changes were found OK and hence CAR is closed.				

Type	Date	29/05/2015		
CAR#08	Reference	UN Comments		
Description of the Non Conformance				
Page 57 of the revised PDD describes energy meters of “Me1”, “Me2A”, “Me2B”, “Me2D”, “Me3A” and “Me3B” in the monitoring system, whereas the monitoring point related to those energy meters are not illustrated in the diagram of the monitoring report (page 6). In addition, the description of “Me3A” and “Me3B” in the revised PDD (page 57) is not consistent with the description of “Me3” in the monitoring report (page 11), since the revised PDD indicates two meters whereas the monitoring report indicates one meter for the monitoring of in house electricity consumption. (PS Version 7 para 250)				
1 st Response from PP		Date	03/05/2015	
Power supplied to recipient LMEL is from 2 transformers, one is running with installed meter Me3A on line and another is standby with installed meter Me3B, but also in charged condition. However the electricity passes through only one transformer with Me3 A as meter. Normally Me3 A is in line and Me3B is only hot standby. Normally Me3B readings are zero. Occasionally it is possible that both transformers are taken in line to meet demand of LMEL Recipient. Thus, there are two meters to record the energy consumption of Recipient LMEL and Me3 is taken as sum of Me3A and Me3B. Kindly find attached revised Monitoring report and revised PDD in track change mode. The diagram showing the monitoring points is also clearly shown in both revised MR & PDD. Me3B normally shows zero reading.				
During site visit by verification team this was checked that is why verification report clearly mentions Me3A & Me3B meters. The log books maintained at site i.e. Daily DCS readings showing hourly readings were also cross checked during site visit by the Audit team. Also, the Calibration reports of both the meters were also checked and provided the copy of the same.				
1 st Assessment by Audit Team	Status	Closed	Date	27/07/2015
It was confirmed by the verification team that the monitoring point related to the energy meters i.e. “Me1”, “Me2A”, “Me2B”, “Me2D”, “Me3A” and “Me3B” are appropriately illustrated in the Single Line Diagram of the monitoring report.				
During on site assessment, the verification team confirmed that there were 2 meters namely, “Me3A” and “Me3B”, installed for measuring electricity consumption in the LMEL facility. The DCS daily logs were also reviewed to confirm the actual monitoring plan implemented on the project site. It was observed by the assessment team that the previous versions of the PDD and MR were inadvertently using “Me3” as representation of combined reading for both “Me3A” and “Me3B” meters. However, it was not explained anywhere in the documents. The revised PDD and MR now contains definition of “Me3” (page 57 of PDD) as combined reading of Me3A and Me3B meters which is considered appropriate by the verification team.				
Table 3.4.1 of section 3.4 of the verification report is also revised to include the validation of the further changes made to the PDD. The verification team has confirmed the appropriateness of the changes.				

CAR#08 is closed.

Type	Date	29/05/2015
CAR#09	Reference	UN Comments
Description of the Non Conformance		
In table "Summary of net electricity gene" of the ER spreadsheet, it is observed that the sum of Recipient Power Supply to LMEL and Recipient Power Supply to Grid (7366.5 MWh) is higher than net electricity generation (7235.3 MWh) in July 2013. Please clarify why the source data and crosscheck data for net electricity generation are not mutually consistent.		
1 st Response from PP	Date	03/05/2015
<p>Being a power Recipient LMEL, flow of power is through Me3 A/B to supply electricity to LMEL. WHRB based power plant normally meets the full demand of LMEL. However on the day of 13/07/2013, WHRB electricity generation was lower than the demand of LMEL and the additional power required was imported from the grid which also flows through Me3A/B. On such an occasion, the energy recorded in Me3A and Me3B is sum of power imported from grid and the own generation. Import of electricity happens though Me4 which is a bidirectional MSETCL meter. Hence, the imported power also passes through Me3 A/B for supplying to LMEL.</p> <p>In July 2013, this import of electricity was done from grid on 12/07/2013 for 2 hrs, 18/07/2013 for 10 hrs, 19/07/2013 for 24 hrs, 20/07/2013 for 12 hrs, 21/07/2013 for 21 hrs, 23/07/2013 for 5 hrs, 24/07/2013 for 22 hrs, 25/07/2013 for 7 hrs and 26/07/2013 for 7 hrs</p> <p>July month electricity supply is as follows:</p> <p>Power plant generation (Me1): 8404 MWh</p> <p>Auxiliary consumption (Me2A/B/C/D): 1168.7 MWh</p> <p>Net electricity available from power plant : $8404 - 1168.7 = 7235.3$ MWh</p> <p>Export to grid which is committed and has to be supplied Me4 meter = 5866.5 MWh</p> <p>Transformer losses in in export (1.25% approx) = 73.8 MWh</p> <p>Power available for LMEL from WHEB power plant = $7235.3 - 5866.5 - 73.8 = 1295$ MWh</p> <p>Power received by LMEL through Me3A/Me3B = 1500.036 MWh</p> <p>Net import from grid = $1500 - 1295 = 205$ MWh</p> <p>As per records the import of power from grid = 205 MWh</p> <p>We are also subtracting 205 MWh from the July 2013 data and the ERs again get reduced to 71,097 tCO₂ instead of 71,199 tCO₂.</p> <p>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 July 2013 of Monitoring period. The data taken for calculation are sourced from these reports.</p> <p>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</p> <ol style="list-style-type: none"> 1) WHRB steam generation 2) FBC steam generation 3) Flue gas flow 4) Meter readings for auxiliary consumption Me2A/2B/2D 5) Meter readings for LMEL consumption Me3A/ 3B 6) Export of electricity to grid Me4 		

However, the occasional import from grid, that takes place in events when the captive generation is not sufficient to meet the LMEL requirement, was not accounted in the ER calculation. Hence, the inconsistency in July 2013 readings (as explained above). For the current verification, Me4 import data has been attached herein for the complete monitoring period. Please note Me4 is bidirectional and records both the import & Export while Me3A & ME3B are unidirectional and all the electricity is either from the power plant which is measured through Me2 or from Me3A & ME3B meters which is supplied to in house facility.

The log books maintained at site i.e. Daily DCS readings showing hourly readings were also cross checked during site visit by the Audit team.

1st Assessment by Audit Team	Status	Open	Date	27/07/2015
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The explanation provided by the PP and the import data is reviewed by the verification team from the electrical log books and seems reasonable. It is also noted that there is no provision in the PDD for accounting such deviation from the normal operations. Therefore, it is not in compliance with the monitoring plan of the latest PDD and any such amendment to the actual monitoring shall be appropriately explained in the PDD.

CAR#09 is open.

2nd Response from PP	Date	08/08/2015
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PDD is revised to include import reading in B.7 and the procedure for calculating the net export from Me4 meter by deducting the total imports from the total exports by Me4 meter. The Spreadsheet is revised and attached for your kind perusal please.

2nd Assessment by Audit Team	Status	Closed	Date	14/09/2015
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The revised PDD was reviewed and found to have appropriately incorporated the changes in calculation of ERs as implemented on ground. The revised MR is also reviewed to confirm that the revision of emission reduction calculation is appropriately incorporated in accordance with the revised procedures in registered PDD. The verification team confirmed that the revised documents were complying with the CDM guidelines.

CAR#09 is closed.

Type	Date	29/05/2015
CAR#10	Reference	UN Comments
Description of the Non Conformance		
With regard to the calculation of energy content in WHRB steam and FBC steam (i.e. table "Emission Reduction calculations" in the ER spreadsheet), it is not clear how those values are calculated from the hourly-recorded steam/water temperature, steam pressure and quantity. Please submit the original SCADA sheets. Please include the detailed calculation and procedure in the monitoring report on how the energy content of steam is calculated from the data recorded in SCADA system.		
1st Response from PP	Date	03/05/2015
The data is sourced from DMRI reading from SCADA. We are enclosing here with DCS generated SCADA report for the Monitoring period. The data taken for calculation are sourced from DMRI readings only. So there will be consistency in data. July 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		
<ol style="list-style-type: none"> 1) WHRB steam generation 2) FBC steam generation 3) Flue gas flow 		

- 4) Auxiliary consumption Me2A/B/D
- 5) LMEL consumption Me3A/B
- 6) Export of electricity to grid Me4

Pressure ,temperature and quantity of steam and boiler feed water are continuously monitored and hourly readings are note in the DCS log book. The average temperature of the day for steam and boiler feed water is considered for calculations, which as per registered PDD.

Enthalpy for steam and Water at recorded Av. temperature and Av. pressure are taken from Steam table Link –www.spiraxsarco.com/resources/steam-tables/superheated-steam.asp. This link is mentioned both in MR & Verification report as well as seen by PP from the final reports submitted to us.

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. Kindly find enclosed revised Monitoring Report and hourly spreadsheets as well.

The hourly data is used to calculate daily average data. The daily average readings calculated from measured hourly readings are taken for calculating monthly average of pressure and temperature. The yearly average of pressure and temperature is calculated using monthly average of pressure and temperature.

The steam and flue gas flows of the day are calculated using totaliser reading difference between start of the day and end of the day. The monthly steam and flue gas flow is sum of daily flows, but this is also measured and can be calculated by taking the month's 1st days reading of totaliser and month's last day readings of the totalizer. As the meter is giving readings continuously so this calculation is basically done only to calculate actual consumption monthly. Yearly flow of steam and flue gas is sum of monthly steam and flue gas flow readings. Similarly, even yearly data is measured we can take 1st day's readings and last day of year's readings then calculate, and then also the value will remain same. All the readings so calculated are from measured data only.

The electricity generation and auxiliary consumption of the day are calculated using totaliser reading difference between start of the day and end of the day. The monthly electricity generation and auxiliary consumption is sum of daily generation and consumption.. Yearly electricity generation and auxiliary consumption is sum of daily generation and consumption.

Revised Monitoring report along with hourly data sheets is enclosed. These hourly sheets were submitted during the verification itself and these were basis of the ER calculations.

1st Assessment by Audit Team	Status	Open	Date	27/07/2015
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The revised MR contains the detailed procedure of calculating the energy content of steam from the hourly recorded steam parameters. The verification team has review the same and found it adequately described.

However, the ER calculation sheet and the monitoring data sheets are not appropriately linked.

Hence, CAR#10 is Open.

2nd Response from PP	Date	08/08/2015
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Kindly find enclosed the revised excel sheets with linking monitoring data sheets.

2nd Assessment by Audit Team	Status	Closed	Date	14/09/2015
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The revised excel sheets were reviewed by the verification team. It was confirmed that the calculated parameters were properly linked to the source data in the log books.

CAR#10 is closed.

7. CV OF VERIFICATION TEAM

Competence Statement			
Name	Pankaj Mohan		
Country	India		
Education	MBA (Project Management) AMIETE (Electronics & Telecommunication Engineering)		
Experience	17 Years		
Field	Energy, Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (1.1)	YES		
TA Expert (1.2)	YES		
TA Expert (3.1)	YES		
TA Expert (13.1)	YES		
Reviewed by	Abhishek Mahawar	Date	29/12/2014
Approved by	Ashok Gautam	Date	29/12/2014

Competence Statement			
Name	Lalit Kumar Singhania		
Country	India		
Education	B. Sc. Honours (Agriculture)		
Experience	38 Years		
Field	Iron & Steel, Energy & Environment		
Approved Roles			
Team Leader	NO		
Validator	NO		
Verifier	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (4.3)	YES		
TA Expert (1.1)	YES		
Reviewed by	Abhishek Mahawar	Date	01/06/2015
Approved by	Ashok Gautam	Date	01/06/2015

Competence Statement			
Name	Tarit Roy		
Country	India		
Education	B. Tech. (Electrical Engineering)		
Experience	35 Years		
Field	Over 30 Years of Experience in Iron & Steel Industry, Climate Change & Environment		
Approved Roles			
Team Leader	NO		
Validator	NO		
Verifier	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (4.3)	YES		
Reviewed by	Abhishek Mahawar	Date	29/12/2014
Approved by	Ashok Gautam	Date	29/12/2014

Competence Statement			
Name	Ashok Gautam		
Country	India		
Education	M. Sc. (Environmental Sciences) M. Tech. (Energy & Environmental Management)		
Experience	14 Years		
Field	Energy, Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.1)	YES		
TA Expert (3.1)	YES		
TA Expert (13.1)	YES		
Reviewed by	Abhishek Mahawar	Date	29/12/2014
Approved by	Kaviraj Singh	Date	29/12/2014

History of the document						
Version	Date	Nature of Revision	Prepared by		Reviewed by	
			Name	Date	Name	Date
2.0	02/09/2014	Compliance to VVS V7	Abhishek Mahawar	01/09/2014	Ashok Gautam	02/09/2014
1.0	18/02/2014	Editorial and compliance to VVS V05	Abhishek Mahawar	17/02/2014	Ashok Gautam	18/02/2014
0	01/07/2013	Initial adoption	Abhishek Mahawar	28/06/2013	Kaviraj Singh	01/07/2013