Verification and certification report form for CDM project activities

(Version 02.1)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title and UNFCCC reference number of the project activity	Use of waste gas at Namakwa Sands in South Africa; UNFCCC reference number: 5884
Version number of the verification and certification report	03
Completion date of the verification and certification report	30/05/2019
Monitoring period number and duration of this monitoring period	01; 31/12/2013 to 31/05/2018 (first and last day included)
Version number of the monitoring report to which this report applies	03
Crediting period of the project activity corresponding to this monitoring period	31/12/2013 to 30/12/2023
Project participants	Tronox Mineral Sands (Pty) Ltd WeAct Pty Ltd
Host Party	South Africa
Applied methodologies and standardized baselines	ACM0012 Version 04, "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"
Mandatory sectoral scopes linked to the applied methodologies	1 : Energy industries (renewable - / non-renewable sources) 8 : Manufacturing industries[1]
Conditional sectoral scope(s) linked to the applied methodologies	-
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	373,120 t CO_2e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	222,006 t CO_2e
Name and UNFCCC reference number of the DOE	E-0052: Carbon Check (India) Private Ltd.
Name, position and signature of the approver of the verification and certification report	Amit Anand, CEO 

[1] Applicable sectoral scope updated in line with EB88 Annex 4

SECTION A. Executive summary

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Introduction:

The Project Participant, WeAct Pty Ltd, has commissioned the DOE, Carbon Check (India) Private Ltd. (CCIPL) to perform an independent verification of the CDM Project Activity "Use of waste gas at Namakwa Sands in South Africa" in India (hereafter referred to as "Project Activity"). Smelting operation occurs in Direct Current (DC) arc furnaces at Namakwa Sands in South Africa owned by Tronox Mineral Sands (Pty) Ltd. The smelting process comprises the carbonaceous reduction of ilmenite to produce titania slag with a TiO2 and iron (Fe) with a carbon content. The carbon monoxide (CO) gas is formed in gas cleaning section of the process as a result of the presence of the carbon in the reductant. If the reductant contains volatile hydrocarbons, as is the case at Namakwa Sands, hydrogen (H2) gas is also formed. This CO and H2 gas is referred to as furnace offgas. In the pre project scenario, the majority of the furnace off-gas was flared. In the project activity, off gas is utilized for electricity generation. The electricity is generated through 8 combustion engines of 1,698 kW capacity each. The generated electricity is utilized to meet the requirement for the manufacturing facility of Namakwa sands and thus it will substitute imported electricity from Eskom who is the electricity provider in the Southern Africa and connected with South African Power Pool (SAPP grid) which is dominated by fossil fuel based power plants. Therefore, the project activity generates emission reductions by avoiding CO_2 emissions that would have been generated from fossil fuel based grid connected power plants.

This report summarises the findings of the verification of the project, performed on the basis of paragraph 62 of the CDM Modalities & Procedures, as well as criteria given to provide for consistent project operations, monitoring and reporting and the subsequent decisions by the CDM Executive Board. Verification is required for all registered CDM project activities intending to confirm their achieved emission reductions and proceed with request for issuance of CERs. This report contains the findings and resolutions from the verification and a certification statement for the certified emission reductions.

Objective:

Verification is the periodic independent review and ex-post determination of both quantitative and qualitative information by a Designated Operational Entity (DOE) 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 a DOE 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 project activity for the period 31/12/2013 to 31/05/2018 (including both the days).

The purpose of verification is to review the monitoring results and verify that the monitoring methodology was implemented according to the monitoring plan and monitoring data, and used to confirm the reductions in anthropogenic emissions by sources, is sufficient, definitive and presented in a concise and transparent manner. CCIPL's objective is to perform a thorough, independent assessment of the registered project activity.

In particular, the monitoring plan, monitoring report and the project's compliance with relevant UNFCCC and host Party criteria are verified in order to confirm that the component project/s has/have been implemented in accordance with the previously registered/included component project design and conservative assumptions, as documented. It is also confirmed if the monitoring plan is in compliance with the registered PDD and the approved monitoring methodology.

Scope:

The scope of the verification is:

- To verify the project implementation and operation with respect to the registered PDD
- To verify the implemented monitoring plan with the registered PDD and applied baseline and monitoring methodology
- To verify that the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement
- To verify that reported GHG emission data is sufficiently supported by evidence

The verification shall ensure that the reported emission reductions are complete and accurate in order to be certified.

The verification comprises a review of the monitoring report over the monitoring period from 31/12/2013 to 31/05/2018 and based on the registered PDD in part of the monitoring parameters and monitoring plan, emission reduction calculation spreadsheet, monitoring methodology and all related evidence provided by project participant.

On-site visit and stakeholders' interviews are also performed as part of the verification process.

The verification team assigned by the DOE concludes that the PDD (Version 09, dated 13/11/2012) /B04/ and the Monitoring report (version 03, dated 30/05/2019) /2/, meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol and paragraph 62 of CDM M& P, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification has been conducted in-line with the CDM VVS for project activities, version 02.0 /B01-1/.

The project activity was correctly implemented according to selected monitoring methodology, monitoring plan and the registered PDD /B04/. The monitoring system was installed, maintained in a proper manner, while collected monitoring data allowed for the verification of the amount of achieved GHG emission reductions. Through the review and on site visit the verification team confirms that the project activity has resulted in the 222,006 tCO_2e emission reductions during the first monitoring period.

CCIPL as a DOE is therefore pleased to issue a positive verification opinion expressed in the attached Certification statement.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader / Verifier / Technical Expert / Local Expert	IR	Dimri	Anubhav	CCIPL	X	X	X	X
2.	Team Member	IR	Agarwalla	Sanjay Kumar	CCIPL	X		X	X

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Singh	Vikash Kumar	CCIPL
2.	Approver	IR	Anand	Amit	CCIPL

SECTION C. Application of materiality

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	No risk	Nil	Not applicable	Complete verification of all the monitoring records was done by the verification team and compared with the values indicated in the emission reduction spreadsheet.

C.2. Consideration of materiality in conducting the verification

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In line with Guidelines for Application of materiality in verifications /B06/, a reasonable level of assurance is defined for the verification of the project by complete verification of all the values indicated in the emission reduction spreadsheet in documents at the document review stage and onsite. There are no material errors, omissions or misstatements

SECTION D. Means of verification

D.1. Desk/document review

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The verification was performed primarily based on the review of the Monitoring report /1/ and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology. Documents reviewed or referenced during the verification are listed in Appendix 3 below.

D.2. On-site inspection

Duration of on-site inspection: 14/01/2019				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	An assessment of the implementation and operation of the registered project activity as per the registered PDD	Namakwa Sands, South Africa	14/01/2019	Anubhav Dimri
2.	A review of information flows for generating, aggregating and reporting the monitoring parameters	Namakwa Sands, South Africa	14/01/2019	Anubhav Dimri
3.	Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD	Namakwa Sands, South Africa	14/01/2019	Anubhav Dimri
4.	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	Namakwa Sands, South Africa	14/01/2019	Anubhav Dimri
5.	A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology and corresponding tool(s), where applicable	Namakwa Sands, South Africa	14/01/2019	Anubhav Dimri
6.	A review of calculations and assumptions made in determining the GHG data and emission reductions	Namakwa Sands, South Africa	14/01/2019	Anubhav Dimri
7.	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	Namakwa Sands, South Africa	14/01/2019	Anubhav Dimri

D.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Haley	Peter	Tronox	14/01/2019	Project implementation and operation management	Anubhav Dimri
2.	March	Glen	Tronox	14/01/2019	Project implementation and operation, monitoring procedure, data and information flow, QA/QC Procedures	Anubhav Dimri
3.	Morlol	Chris	Tronox	14/01/2019	Monitoring equipment operation and maintenance	Anubhav Dimri
4.	Malamba	Noluwyo	Tronox	14/01/2019	Plant operation and maintenance; statutory clearances	Anubhav Dimri

5.	Olga	Cube	Tronox	14/01/2019	Plant operation and maintenance; staturory clearances	Anubhav Dimri
6.	Borah	Deepjyoti	Consultant	14/01/2019 31/01/2019 (through skype)	Monitoring Report preparation, Emission reduction calculation, Data management	Anubhv Dimri; Sanjay Kumar Agarwalla

D.4. Sampling approach

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Not applicable

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	01	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	03	-	-
Compliance with the calibration frequency requirements for measuring instruments	01	-	-
Assessment of data and calculation of emission reductions or net removals	02	-	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation			
Others (please specify) – Editorial, UNFCCC I & R query	-	02	-
Total	06	03	-

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	Document Review, Interview
Findings	CAR 01 had been raised and successfully resolved. Please refer to Appendix 4.
Conclusion	The verification team has determined whether the monitoring report was completed using the valid version of the applicable monitoring report form /B03/. The verification team has checked whether all the sections of the monitoring report follow the guidelines provided in the template and instruction text requirement. Verification team confirms that the latest available version of monitoring report template /B03/ has been used by the PP and the MR /2/ is in compliance of the monitoring report form and instructions therein. CCIPL, had made the version 01, dated 27/11/2018 of the Monitoring report /1/, covering the monitoring period from 31/12/2013 to 31/05/2018 (both days inclusive) publicly available on 03/12/2018 through its dedicated interface on the UNFCCC website /B05/.

	This confirms compliance with the §352 and §353 of CDM VVS for project activities, version 02.0 /B01-1/.

E.2. Remaining forward action requests from validation and/or previous verifications

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This is the 1st periodic verification of the project activity. There was no forward action request from validation of the project activity.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	Document Review, Interview
Findings	-
Conclusion	The project activity involvs installation and operation of 8 internal combustion engines of 1698 kW capacity each at Namakwa Sands in South Africa owned by Tronox Mineral Sands (Pty) Ltd. The smelting process at Namakwa Sands comprises the carbonaceous reduction of ilmenite to produce titania slag with a TiO2 and iron (Fe) with a carbon content. The carbon monoxide (CO) gas is formed in gas cleaning section of the process as a result of the presence of the carbon in the reductant. If the reductant contains volatile hydrocarbons, as is the case at Namakwa Sands, hydrogen (H2) gas is also formed. This CO and H2 gas is referred to as furnace offgas. In the pre project scenario, the majority of the furnace off-gas was flared. In the project activity, off gas is utilized for electricity generation. The generated electricity is utilized to meet the requirement for the manufacturing facility of Namakwa sands and thus it substitutes imported electricity from Eskom who is the electricity provider in the Southern Africa and connected with South African Power Pool (SAPP grid) which is dominated by fossil fuel based power plants. Therefore, the project activity generates emission reductions by avoiding CO_2 emissions that would have been generated from fossil fuel based grid connected power plants. The project is located in in Saldanha Bay in Western Cape Province in South Africa. The project was commissioned on 01/01/2014 /5/. CCIPL by means of the on-site inspection and document review, assessed that all physical features (technology including plant capacity, project equipment and monitoring) as stated in the registered PDD are in place and that the project participant has operated the project as per the registered PDD /B04/. The verification team checked the design features during the on-site visit and also document review and found it to be consistent with the features stated in the registered PDD. The 8 gas engines are of GE Jenbacher make and 1698 kWe capacity each /6/. Monitoring plan was also checked and found to be in line with the registered PDD. CCIPL's verification team confirms that the project activity is implemented within the boundary of the project activity as described in the PDD /B05/ and the implementation and operation of the project activity has been conducted in accordance with the description contained in the PDD /B04/. In summary, the monitoring period is reasonable, and the operation of the project activity is in accordance with the registered PDD /B04/. There were no changes observed during OSV from the technology stated during the validation and earlier verification. CCIPL's verification team considers the project description to be complete and accurate. The verification team took cognizance of §338 (b)(i), §354, §355 and §356 of CDM VVS for project activities, version 02.0 /B01-1/.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines

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Not applicable

E.4.2. Corrections

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Not applicable

E.4.3. Change to the start date of the crediting period of the project activity

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The start date of crediting period was changed from 01/01/2013 to 31/12/2013 as visible on the project page at UNFCCC web site (http://cdm.unfccc.int/Projects/DB/TUEV-SUED1331554627.86/view)

E.4.4. Inclusion of a monitoring plan

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Not applicable

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other applied standards or tools

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Not applicable

E.4.6. Changes to the project design

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Not applicable

E.4.7. Changes specific to afforestation and reforestation project activities

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Not applicable

E.5. Compliance of the registered monitoring plan with the methodology including applicable tools and standardized baselines

Means of verification	Document Review, Interview
Findings	-
Conclusion	The verification team is able to confirm that the monitoring plan contained in the registered PDD /B04/ is in accordance with the approved methodology applied by the project activity, i.e. ACM0012 Version 04 /B02/. The verification team determined against all the information provided in the MR /2/, whether it is in-line with the applied monitoring methodology. The calculation of emissions has been done in accordance with the formulae and methods described in monitoring plan and the applied methodology. The required information provided in the monitoring report has been cross-checked against the data provided in the ER sheet, monitoring database and observations during OSV. The verification team took cognizance of §357, 358 and §359 of CDM VVS for project activities, version 02.0 /B01-1/.

E.6. Compliance of monitoring activities with the registered monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /B04/. This conclusion has been made based on assessment below in section E.6.1, E.6.2 and E.6.3 below.

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	Document Review, Interview
Findings	-
Conclusion	Verification team confirms that the data and parameters fixed ex ante are in compliance with the registered PDD and monitoring plan /B04/. Please refer to the Annex 1 for assessment of each parameter. The verification team took cognizance of §360 of CDM VVS for project activities, version 02.0 /B01-1/.

E.6.2. Data and parameters monitored

Means of verification	Document Review, Interview
Findings	CL 01, CL 02 and CL 03 had been raised and successfully resolved. Please refer to Appendix 4 for further details.
Conclusion	The verification team confirms that the data and parameters monitored are in compliance with the registered PDD and the monitoring plan /B04/. It is confirmed that the verification team assessed the data / information flow from the point of monitoring to emission reduction calculation and found no gap in the same. Detailed assessment of each parameter has been provided in Annex 2. The verification team took cognizance of §360, §361 and 364 of CDM VVS for project activities, version 02.0 /B01-1/.

E.6.3. Implementation of sampling plan

Means of verification	Document Review, Interview
Findings	-
Conclusion	PP did not apply sampling plan to determine data and parameters monitored during this monitoring period. The verification team has checked all the documents / plant records /7/ and hence sampling plan was not required. The verification team hereby confirms that it checked all the documents.

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	Document Review, Interview
Findings	CL 04 had been raised and successfully resolved. Please refer to Appendix 4.
Conclusion	As per the registered PDD, calibration frequency of the gas flow meters is annually. For the electricity meters, the frequency of calibration is not stated in the PDD. However, PP clarified that as per the manufacturer's recommendation, the electricity meters are to be calibrated every 5 years /8/. The calibration of the the gas flow meters were delayed /8/. The result of delayed calibration reveals that the error observed is within the maximume permissible error of the gas flow meters (i.e. 0.5%) and accordingly the PP has applied (for the period of delay) the maximum permissible error for the adjustment of waste gas quantity in a conservative manner; this is accordance with §366 of CDM VVS for project activities, version 02.0 /B01-1/. This is deemed acceptable. Therefore, accuracy of monitoring equipment's is assured. The verification team took cognizance of §365 of CDM VVS for project activities, version 02.0 /B01-1/.

E.8. Assessment of data and calculation of emission reductions or net removals

In line with the requirement of § 375 of CDM VVS for project activities, version 02.0, the verification team has reviewed the Monitoring report and ER spread sheet to check the arithmetic calculation of the emission reductions. The equation used for the calculation is compared with those provided in the registered PDD /B04/ and the applied methodology ACM 0012, version 04 /B02/ and found to be correct.

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	Document Review, Interview
Findings	CL 05 had been raised and successfully resolved. Please refer to Appendix 4.
Conclusion	The equations for baseline emissions, as provided in the monitoring report /1/ and confirmed with the registered PDD /B04/ and the methodology ACM 0012, version 04 /B02/, are: $BE_y = BE_{Elec,y} = f_{cap} \times f_{wcm} \times \sum j \sum i (EG_{gr,y} \times EF_{Elec,gr,y})$ Where BE_y = Baseline emissions (tCO_2) $BE_{Elec,y}$ = Baseline emissions due to displacement of electricity during the year y (tCO2) $EG_{Gr,y}$ = The quantity of electricity supplied to Namakwa Sands, which in the absence of the project activity would have been sourced from the grid during the year y in MWh $EF_{Elec,gr,y}$ = The CO_2 emission factor for the grid electricity displaced due to the project activity, during the year y (tCO_2/MWh). The calculations for the CO_2 emission factor of the Southern African Power Pool are provided below. 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, as in the case of this project activity. 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 same or less than that generated at a historical level. The calculations for this factor are provided below. $EF_{Elec,gr,y}$ = Combined margin CO_2 emission factor for grid connected power generation (fixed ex ante as 1.036 tCO_2/MWh) From the above equation and the parameter values, For monitoring period (31/12/2013 to 31/05/2018) BE_y = 1 x 1x 221,528.74 x 1.036 tCO_2e = 229503 tCO_2e The verification took cognizance of § 372 of CDM VVS for project activities, version 02.0 /B01-1/.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	Document Review, Interview

Findings	-
Conclusion	The equations for project emissions, as provided in the monitoring report /1/ and confirmed with the registered PDD /B04/ and the methodology ACM 0012, version 04 /B02/, are: $Pey = PE_{EL,y} = EC_{pJ,gr,y} \times EF_{EL,gr,y} \times (1+TDL_{gr,y})$ $PE_{EL,}$ = Project emissions from electricity consumption in year y (tCO_2/yr) $EC_{pJ,gr,y}$ = Quantity of electricity consumed by the project from the grid in year y (MWh/yr) $EF_{EL,gr,y}$ = Emission factor of the grid in year y (tCO_2/MWh) $TDL_{gr,y}$ = Average technical transmission and distribution losses for providing electricity to the grid in year y $PE_{EL,y} = 6738.73 \times 1.036 \times (1+ TDL_{gr,y})$ $= 7,497\ tCO_2e$ The verification took cognizance of § 372 of CDM VVS for project activities, version 02.0 /B01-1/.

E.8.3. Calculation of leakage GHG emissions

Means of verification	Document Review, Interview
Findings	-
Conclusion	There are no leakage emissions associated with the project activity.

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	Document Review, Interview
Findings	-
Conclusion	As leakages are 0, emission reductions are equal to baseline emissions minus projet emissions. Hence $ER_y = BE_y – PE_y$ $= 229503 – 7497 = 222,006\ tCO_2e$ Verification team confirms that all parameters are used correctly in the calculations, all results are verifiable and transparent, all assumptions are described and based on verifiable evidence and calculations are done in accordance with the pre-defined formulae from registered PDD /B04/. The total number of CERs achieved during the monitoring period is 222,006 tCO_2e.

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	Document Review, Interview
Findings	CL 06 had been raised and successfully resolved. Please refer to Appendix 4.
Conclusion	The ex-ante estimated value of the emission reductions for the monitoring period as per the registered PDD is 373,120 tCO_2e and the actual emission reductions achieved for the monitoring period is 222,006 tCO_2e. Verification team confirms that actual emission reduction is lower than the estimate of the registered PDD for the current monitoring period. The verification team took cognizance of §372 of CDM VVS for project activities, version 02.0 /B01-1/.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	Document Review, Interview
Findings	-
Conclusion	Verification team confirms that actual emission reduction is lower than the estimate of the registered PDD for the current monitoring period.

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	Document Review, Interview
Findings	-
Conclusion	CERs achieved upto 31st Dec 2012 = 0 tCO_2e. CERs achieved from 1st Jan 2013 = 222,024 tCO_2e

E.9. Assessment of reported sustainable development co-benefits

Means of verification	Not applicable
Findings	-
Conclusion	Not applicable

E.10. Global stakeholder consultation

Means of verification	Not applicable as no comments were received.
Findings	-
Conclusion	Not applicable as no comments were received.

SECTION F. Internal quality control

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The final verification report passed a technical review before being submitted to the UNFCCC Executive Board. The technical review is performed by a technical reviewer qualified in accordance with CCIPL's qualification scheme for CDM validation and verification.

SECTION G. Verification opinion

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Carbon Check (India) Private Ltd. (CCIPL) has performed the first periodic verification of the registered CDM Project Activity "Use of waste gas at Namakwa Sands in South Africa" having UNFCCC reference number as 5884.

The verification team assigned by the DOE concludes that the project activity as described in the registered PDD (Version 09, date 13/11/2012) /B04/ and the Monitoring report (version 03, dated 30/05/2019) /2/, meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol and paragraph 62 of CDM Modalities & Procedures, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification has been conducted in-line with the CDM VVS requirements for project activities, version 02.0 /B01-1/.

<u>Verification methodology and process</u>

The Verification team confirms the contractual relationship signed on 30/11/2018 between the DOE, Carbon Check (India) Private Ltd. and the Project Participant, (WeAct Pty Ltd). The team assigned to the verification meets the CCIPL's internal procedures including the UNFCCC requirements for the team composition and competence. The verification team has conducted a thorough contract review as per UNFCCC and CCIPL's procedures and requirements.

The verification has been performed as per the requirements described in the CDM VVS for project activities, version 02.0 and constitutes the review and completion of the following steps:

- Reviewing the registered PDD (version 09, date 13/11/2012), including the monitoring plan and the corresponding validation report /B04/;
- Publication of the MR (version 01, 27/11/2018) /1/ on the UNFCCC website on 03/12/2018
- Desk review of the validation report, MR and other relevant documents including documents related to the projects activities in emission reductions
- Review of the applied monitoring methodology (ACM 0012 version 04) /B02/;
- Review of any CMP and EB decisions, clarifications and guidance /B05/;
- On-site assessment (14/01/2019)
- Resolution of CARs and CLs raised during verification
- Issuance of Verification Report

The project activity was correctly implemented according to selected monitoring methodology, monitoring plan and the registered PDD. The monitoring system was installed, maintained in a proper manner, while collected monitoring data allowed for the verification of the amount of achieved GHG emission reductions. Through the review and on-site visit, the verification team confirms that the project activity has resulted in the 222,006 tCO_2e emission reductions during the first monitoring period.

The break-up of emission reduction up-to 31/12/2012 and 01/01/2013 onwards as verified during the course of verification are as below:

Item	Emission reductions up to 31 December 2012	Emission reductions from 1 January 2013 onwards
Emission reductions (t CO_2e)	0	**222,006**

CCIPL as a DOE is therefore pleased to issue a positive verification opinion expressed in the attached Certification statement.

SECTION H. Certification statement

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Carbon Check (India) Private Ltd., the DOE, has performed the verification of the registered project activity "Use of waste gas at Namakwa Sands in South Africa" having UNFCCC Registration Number 5884. The project activity involves installation and operation of 8 internal combustion engines of 1698 kW capacity each. In the project activity, off gas is utilized for electricity generation. The generated electricity is utilized to meet the requirement for the manufacturing facility of Namakwa sands and thus it substitutes imported electricity from Eskom who is the electricity provider in the Southern Africa and connected with South African Power Pool (SAPP grid) which is dominated by fossil fuel based power plants. Therefore, the project activity will generate emission reductions by avoiding CO_2 emissions that would have been generated from fossil fuel based grid connected power plants.

The project activity is located in The project is located in in Saldanha Bay in Western Cape Province in South Africa. The PP is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions. It is DOE's responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity. The DOE does not express any opinion on the selected baseline scenario or on the validated and registered PDD. The verification is carried out in-line with the VVS requirements.
The verification was performed to identify the compliance with implementation and monitoring requirements, and to verify the actual amount of achieved emission reductions, through obtaining evidence and information on-site that included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

The verification is based on:
— PDD version 09 dated 13/11/2012 and the corresponding validation report;
— Approved monitoring methodology ACM 0012, version 04;
— Monitoring reports versions 01, dated 27/11/2018, version 02, dated 18/03/2019 and version 03, dated 30/05/2019.

This statement covers verification period from 31/12/2013 to 31/05/2018 (including both the dates).

The DOE had raised 06 clarifications and 03 corrective action request, all of which have been resolved by the PP.

The DOE considers necessary to give reasonable assurance that reported GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology and the monitoring plan contained in the registered PDD are fairly stated.

The DOE, hereby certifies that the project activity, achieved emission reductions by sources of GHG equal to 222,006 tCO_2 equivalent and all monitoring requirements have been fulfilled and is substantiated by an audit trail that contains evidence and records. The break-up of emission reduction up-to 31/12/2012 and 01/01/2013 onwards as verified during the course of verification are as below:

Item	Emission reductions up to 31 December 2012	Emission reductions from 1 January 2013 onwards
Emission reductions (t CO_2e)	0	222,006

Appendix 1. Abbreviations

Abbreviations	Full texts
CL	Clarification Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CAR	Corrective Action Request
CCIPL	Carbon Check (India) Private Ltd.
CER	Certified Emission Reduction
CL	Clarification Request
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide Equivalent
DR	Document review
DOE	Designated Operational Entities
DVR	Draft Verification Report
EB	CDM Executive Board
EF	Emission Factor
EI	External individual
FA	Final Approval
FAR	Forward Action Request
FVR	Final verification Report
GHG	Greenhouse gas(es)
I	Interview
IPCC	Intergovernmental Panel on ClimateChange
IR	Internal resource
NABL	National Accredation Board for Testing and Calibration Laborataries
PP	Project Participant
OSV	On Site Visit
QC/QA	Qualitycontrol/Qualityassurance
RMP	Revised Monitoring Plan
TA	Technical Area
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
WPL	WeAct Pty Ltd

Appendix 2. Competence of team members and technical reviewers

Carbon Check (India) Private Ltd.

Anubhav Dimri

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 06.0):

For following functions:

Validator	☒	Team Leader	☒	Technical reviewer	☒
Verifier	☒	Technical Expert	☒	Local Expert[1]	☒

In the following Technical Areas:

TA 1.1	☒	TA 3.1	☒	TA 5.2	☐	TA 9.2	☐	TA 13.2	☐
TA 1.2	☒	TA 4.1	☐	TA 8.1	☒	TA 10.1	☐	TA 14.1	☐
TA 2.1	☐	TA 5.1	☐	TA 9.1	☐	TA 13.1	☒		

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2018

Valid Till
23/12/2019

Revision History of the Document

26/12/2014	Initial Adoption
24/12/2015	Annual Revision
20/01/2016	Interim Revision for office address change
23/12/2016	Annual Revision
24/12/2017	Annual Revision
24/12/2018	Annual Revision

[1] India, South Africa

CARBON CHECK (INDIA) PRIVATE LIMITED
Registered in India: U74930DL2012PTC232495
Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: G 49 & 50, 3rd Floor, Sector – 3, NOIDA (Uttar Pradesh) – 201301
Tel: +91 120 4373114| URL: www.carboncheck.co.in
e-mail: info@carboncheck.co.in

Carbon Check (India) Private Ltd.

Sanjay Agarwalla

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 06.0):

For following functions:

Validator	☒	Team Leader	☒	Technical reviewer	☒
Verifier	☒	Technical Expert	☒	Local Expert[1]	☒

In the following Technical Areas:

TA 1.1	☒	TA 3.1	☒	TA 5.2	☒	TA 9.2	☒	TA 13.2	☐
TA 1.2	☒	TA 4.1	☒	TA 8.1	☐	TA 10.1	☐	TA 14.1	☐
TA 2.1	☒	TA 5.1	☒	TA 9.1	☒	TA 13.1	☒		

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2018

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Tel: +91 120 4373114| URL: www.carboncheck.co.in
e-mail: info@carboncheck.co.in

Carbon Check (India) Private Ltd.

Vikash Kumar Singh

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	☒	**Team Leader**	☒	**Technical reviewer**	☒
Verifier	☒	**Technical Expert**	☒	**Local Expert[1]**	☒

In the following Technical Areas:

TA 1.1	☒	**TA 3.1**	☒	**TA 5.2**	☐	**TA 9.2**	☐	**TA 13.2**	☒
TA 1.2	☒	**TA 4.1**	☒	**TA 8.1**	☐	**TA 10.1**	☐	**TA 14.1**	☐
TA 2.1	☐	**TA 5.1**	☐	**TA 9.1**	☐	**TA 13.1**	☒		

Mr. Amit Anand
CEO

Date of Approval
24/12/2018

Valid Till
23/12/2019

Revision History of the Document	
26/12/2014	Initial Adoption
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24/12/2017	Annual Revision
24/12/2018	Annual Revision

[1] India, South Africa

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e-mail: info@carboncheck.co.in

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	WPL	1. Web hosted Monitoring report 2. Monitoring report	Version 01, 27/11/2018 Version 02, 18/03/2019	PP
2	WPL	Final Monitoring report	Version 03, 30/05/2019	PP
3	WPL	Emission reduction calculation spread sheet corresponding to /1/	-	PP
4	WPL	Emission reduction calculation spread sheet, corresponding to /2/	Version 03, 30/05/2019	PP
5	Tronox	Evidence for the commissioning of the project on 01/01/2014	-	PP
6	GE Jenbacher	Evidence for the technical specifications of the project equipment (gas engines)	-	PP
7	Tronox	Evidence for the following monitored parameters covering the monitoring period: i. Quantity of waste gas used for energy generation ($Q_{wcm,y}$) ii. Quantity of electricity supplied to Namakwa Sands ($EG_{GR,y}$) iii. Quantity of electricity consumed by the project activity from the grid ($EC_{PJ,gr,y}$) iv. Technical transmission and distribution losses for providing electricity to the grid ($TDL_{gr,y}$) v. Abnormal operation of the project facility including emergencies and shutdown	-	PP
8	i. Rosemount / Siemnes ii. Elster	Calibration certificates for the following monitoring equipment covering the monitoring period: i. Differential flow meters for waste gas ii. Electricity meters iii. Evidence for the calibration frequency for energy meters	-	PP
9	Tronox	Proof of training and competency of the project operators	-	PP
10	Tronox	Operation and Management structure for monitoring of the project activity	-	PP
11	Tronox	Process flow diagram (waste gas and electricity) for the project activity	-	PP
12	Shriram Consultants / Elster	Evidence for competence of the person/agency who conducted the calibrations for gas flow meters and energy meters	-	PP

/B01/		1. CDM Validation and Verification Standard for project activities, version 02.0 2. CDM Project Standard for project activities, version 02.0 CDM Project Cycle Procedure for project activities, version 02.0		PP
/B02/		Applied methodology: ACM0012 Version 04, "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"		
/B03/	UNFCCC	Instructions for filling out the monitoring report form for CDM project activities, version 06	http://cdm.unfccc.int/	Others
/B04/	UNFCCC	Registered PDD (version 09 dated 13/11/2012), and corresponding validation report	http://cdm.unfccc.int/	Others
/B05/	UNFCCC	Websites: http://cdm.unfccc.int/	http://cdm.unfccc.int/	Others
/B06/	UNFCCC	Guideline on the application of Materiality in verifications (version 02.0)	http://cdm.unfccc.int/	Others

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verifications

FAR ID	xx	**Section no.**	E.2	**Date:** DD/MM/YYYY
Description of FAR				
Project participant response				**Date:** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

Table 2. CL from this verification

CL ID	CL 01	**Section no.**	E.6.2	**Date:** 01/02/2019
Description of CL				
PP needs to provide clarification for the statement "*The electricity readings are used for billing purposes and logged electronically for the purposes of calculating emission reductions*". PP is requested to provide evidence of any billing and or backup of the SCADA.				
PP response				**Date:** 18/03/2019
PP is submitting the backup of SCADA data to DOE for kind perusal and acceptance. PP would like to further inform and describe that there are daily readings at second's interval and daily totalizers of the summated values in the DCS which are extracted to the ERP system every 24 hours. For example, the total power exported and imported is the algebraic summation in the DCS of the values from the four electrical energy meters (i.e. both the main and check meters). These data/information are electronically logged (at second's interval and also as summated daily values) w.r.t. each energy meter and same can be extracted electronically for backup reference. For the purpose of emission reduction calculation, the monthly-totalized electricity values recorded by the energy meters are extracted from DCS (in the form of monthly PDF) and the same is considered as the source of data for ER estimation.				
Documentation provided by the PP				
Daily data sheets extracted from SCADA (both – sheets in the form of every second interval readings and sheet with daily totalizers of the summated values).				
DOE assessment				**Date:** 19/03/2019
The verification team has cross checked the reported electricity values used for emission reduction calculation with the data downloaded from the DCS and found them to be correct. The CL is closed.				

CL ID	CL 02	**Section no.**	E.6.2	**Date:** 01/02/2019
Description of CL				
For the monitoring parameter "Abnormal operation of the project facility including emergencies and shutdown", the value has been reported as 0. PP needs to provide evidence for all such records (including any shutdowns, etc.). It is noted that for the months of Jan 2014 and Sep 2016, the electricity generated per Nm3 of the gas are considerably different as compared to rest of the months during the monitoring period.				
PP response				**Date:** 18/03/2019

PP would like to clarify that there were some differences in some monthly values (e.g. Jan 2014, Aug & Sep 2016) as compared to other months. Following are the technical reasons:
Jan 2014: Project plant was commissioned on 01/01/2014 and first few days were taken for plant stabilizing and synchronizing the calculation and reporting system. Because of this, there was an error in the calculation/reporting of the gas waster gas feed to the engines during the first 7 days of the month, this was then corrected. However, the energy exported as per the calibrated electrical meters is correct.

Aug 2016: Furnace number 1 was out of operation for the entire month due to low market demand. Furnace 2 was out of operation from 29th Aug to 2nd Sep for maintenance reasons. For these days there seems to be an error in the calculation of the gas supply to the generation plant, this should have been zero. However the data recorded on the total energy exported is correctly stated as zero.

Sept 2016: Similarly for the period up to 23rd Sep the generation plant was offline – no energy exported. As above there appears to have been an error in the calculation of the waste gas feed to the plant.

The details of the plant abnormal operation and shutdown periods are submitted to DOE.

Documentation provided by the PP

i) "Abnormal & Shutdown Operation Register" (Records from SCADA).
ii) Signed statement from Tronox clarifying the technical issues of the three months of abnormality in record system.

DOE assessment	**Date:** 19/03/2019

PP has provided the explanation for the abnormal readings for the months of Jan 2014, Aug and Sep 2016 which is found to be reasonable. Also PP has provided the log for plant shutdowns for the monitoring period. The CL is closed.

CL ID	CL 03	**Section no.**	E.6.2	**Date:** 01/02/2019

Description of CL

The monitoring data provided are the total monthly values for each parameter (three gas flow meters and two energy meters). PP is requested to provide the breakup of the meter wise readings for each of the monitoring equipment (flow meters and energy meters). Also PP needs to clarify whether the export electricity reported is after deducting the parasitic load and provide the details for the meter which records the parasitic load (parasitic energy has been reported separately).

As per the PDD, the source of "EGgr,y" is "Recipient plant and generation plant measurement records". Evidence to be provided.

PP response	**Date:** 18/03/2019

PART 1 of the CL:
PP would like to clarify that the plant is equipped with a SCADA enable system. There are electronically logged data for each monitoring equipment which are automatically captured in the DCS system and available for cross check at any point of time.

Therefore, PP is submitting the meter wise readings for each of the monitoring equipment extracted from SCADA, as follows:

For energy meters, the meter wise values are logged at DCS electronically and both daily readings on second's interval and daily totalized values are available. Whereas in case of flow meters, the meter wise readings are totalized for gas trains and flare stack separately; and same are logged at DCS.

All these data sheets are extracted from SCADA and submitted to the verification team. Also, the section C of the MR is now revised to include details of data recording system and also the process flow diagram for further reference.

PART 2 of the CL:
PP would like clarify that the energy exported is measured on the energy meters on the export feeders after the parasitic load has been consumed.

PART 3 of the CL:
PP would like to clarify that the energy exported is not 'sold' into the smelter (Namakwa Sands), nor is the energy exported split between any of the different process cost centres. Therefore, there is no separate record system for the recipient plant. Further, PP would like to justify that as per the holding generation license (letter from NERSA, dated 5th Jun 2012); the supplier /generator of the electricity generated by the

gas engines at Tronox facility and the recipient of electricity are effectively considered to be the same body. Therefore, separate records related to electricity received at recipient end i.e. "Namakwa Sands" is not required. For all accounting purposes, the data recorded at Generation end i.e. "Tronox CDM Project" is considered by the organization as common record for both the parts, i.e. generation end and recipient end.

Thus, source of data for the parameter "EGgr,y" is common the source, i.e. monthly records at generation plant; which is also used by recipient end whenever required.

Documentation provided by the PP

i) Daily & monthly data sheets for all the monitoring parameters and w.r.t the respective meters (extracted sheets from the SCADA)

ii) Signed Statement/Memorandum from PP and also the copy of the Holding Generation license.

DOE assessment	**Date:** 19/03/2019

The energy meter reading and the gas flow meter readings are logged in DCS continuously. The aggregated readings of the energy meters and gas flow meters have been provided to the verification team. The verification team has cross checked the reported waste gas value and the electricity exported values from the above data base and found them to be correct. The logging system of the energy meters and gas flow meters was verified during the on-site visit.
The verification team confirms that the electricity value reported is after the parasitic load.

As the electricity generating and consuming entity is the same, there is no separate recording. The verification team deemed this acceptable. The CL is closed.

CL ID	CL 04	**Section no.**	E.7	**Date:** 01/02/2019

Description of CL

PP is requested to provide the monitoring equipment details (including their calibration status) in section D.2 of the MR along with the evidences. Also PP is requested to provide the calibration frequency for electricity meters (which has not been provided in the PDD).

PP response	**Date:** 18/03/2019

PP has included the details of the monitoring equipment (i.e. electricity meters and the flow meters) under Annex 1 of the report. Also, the reference to this Annex 1 has been included in the section D.2 of the MR.
As per manufacturer's recommendation, the calibration frequency of the electricity meters has been considered to be once in five years.

PP would also like to inform that there was delay in calibration for gas flow meters. Therefore, in line with CDM VVS version 02, PP has applied maximum permissible error factor of the meters to the gas values during the calculation of ER, across the entire monitoring period. The revised ER sheet and MR versions are submitted to DOE.

Documentation provided by the PP

Revised ER sheet; Revised MR version
Meter Calibration reports for all the meters (electricity meters and gas flow meters).

DOE assessment	**Date:** 19/03/2019

Monitoring equipment details have been provided in the revised MR and calibration frequency for the electricity meters is 5 years as per the manufacturer's recommendation. The CL is closed.

CL ID	CL 05	**Section no.**	E.8.1	**Date:** 01/02/2019

Description of CL

In the ER spread sheet, Baseline emissions have been rounded up which is not conservative.

PP response	**Date:** 18/03/2019

PP has rechecked the ER sheet. PP would like to confirm that the total value of baseline emission (BEy) has been rounded down and total value of project emission (PEy) has been rounded up, in the "Data Sheet". The difference of BEy & PEy has been considered as the result of the actual emission reductions achieved (ERy), which is also a rounded down value. Thus, the calculation approach considered is already conservative. Also, in order to remove any confusion/uncertainty in conservativeness, PP has removed the function "round" from the monthly ERy values calculated in the "Data sheet".
The revised ER sheet has been submitted to DOE for verification.

Documentation provided by the PP

Revised ER sheet.

DOE assessment	**Date:** 19/03/2019

PP has submitted revised ER spread sheet in which the baseline emissions have been rounded up. The CL is closed.

CL ID	CL 06	Section no.	E.8.5	Date: 01/02/2019
Description of CL				
PP is requested to provide the calculation of ex-ante estimated emission reductions for the monitoring period. The value stated on cover page of the MR and in section E.5 of the MR do not match with each other.				
PP response				**Date:** 18/03/2019
The calculation of ex-ante estimated ERs equivalent to the current monitoring period is included in the ER sheet under the "ER Calculation" tab. This has been referred in the MR under the footnote #3 and also mentioned under the section E.6 of the PDD. Also, the reported value of ex-ante ER has been corrected in the cover page of the PDD, which is now consistent with the value reported in the section E.5 of the revised MR and in the revised ER sheet.				
Documentation provided by the PP				
Revised ER sheet and Revised MR version				
DOE assessment				**Date:** 19/03/2019
PP has provided the calculation of ex-ante emission reductions for the monitoring period in the revised MR which has been checked and found to be correct. The CL is closed.				

Table 3. CAR from this verification

CAR ID	CAR 01	Section no.	E.1	Date: 01/02/2019
Description of CAR				
CAR is raised as the MR completing guidelines have not been followed as below: 1. The applicable sectoral scopes against the applied methodology, as stated in the MR, do not comply with the EB88 Annex 4. 2. PP needs to adopt the latest CDM VVS for project activities (Cp page 9 of MR). 3. On the project page on UNFCCC web site it is seen that the crediting period of this project activity was changed from 01 Jan 13 - 31 Dec 22 to 31 Dec 13 - 30 Dec 23. But this has not been reported in section B.2.3 of the MR.				
PP response				**Date:** 18/03/2019
1. The applicable sectoral scope(s) against the applied methodology has been now revised in the MR in line with EB88, Annex 4. 2. The reference to the delay in meter calibration (in the page 9 of the MR) has been considered from the latest applicable CDM VVS, i.e. version 02. However, the reference to the applicable paragraph was incorrect which has been corrected now. Also, the application of error factor has been corrected in line with latest available calibration certificates. 3. There was an approved change in Crediting Period for the project. The start date of the crediting period of the project activity was changed from 01-Jan-2013 to 31-Dec-2013. This information has been reported under the section B.2.3 of the revised MR.				
Documentation provided by the PP				
Revised ER sheet and Revised MR version.				
DOE assessment				**Date:** 19/03/2019
1. PP has submitted revised PDD stating the applicable sectoral scopes in line with EB 88, Annex 4. 2. PP has applied the latest VVS version in the revised PDD. 3. In the revised MR, PP has stated the change of crediting period in section B.2.3. The CAR is closed.				

CAR ID	CAR 02	Section no.	UNFCCC I & R check comments (issue 1)	Date: 29/05/2019
Description of CAR				
The DOE is requested to explain how it verified the implementation of the project activity in particular the model of the engine put in place. The PDD mentions the model as JGS 620-GS-S.L, whereas as per the the monitoring report, the model is J 620GS-F57. Please refer to paragraph 354 of VVS for project activities (version 02.0).				
PP response				**Date:** 30/05/2019

PP Would like to clarify that both the reference nos. (i.e. JGS 620-GS-S.L and J 620GS-F57) refers to the same type of gensets manufactured and supplied by GE Energy for the project. Here, the coding "JGS 620-GS-S.L" represents the nomenclature for the "Module type" of the Genset, whereas "J 620 GS-F57" is the reference nomenclature of the Engine type.

As referred in the registered PDD under section A.2 (page 3), GE Jenbacher was selected as the gas engine supplier for this project activity at the time of validation however; it was clearly mentioned that PP could only sign a contract with the supplier when a positive validation report is received. Thus, at that time of validation PP has included only the module type of genset, i.e. "JGS 620 GS-S.L" for reference purpose (as referred under the footnote 1 of the registered PDD) which can be verified from the Technical Specification sheet titled "Technical specification of the control" (reference date 30.09.2011), which was submitted to DOE at the time of verification. Thereafter, a technical data sheet (the document titled "Technical Description Genset JGS 620 GS-S.L - F57", reference date 19.01.2012) was available which mentions the 'Engine Type' as "J 620 GS-F57" which also corresponds to the same genset type manufactured and supplied by the technology provider, i.e. GE. This document was also submitted to DOE at the time of verification. These two documents correspond to each other. Therefore, the Engine type has been reported in the MR as per the Technical Data sheet.

However, in order to remove any confusion (as compared to the registered PDD) PP has included a footnote reference to the Engine Type mentioned in the MR which clearly mentions the above two references. Also, the module type of the genset (i.e. "JGS 620 GS-S.L") has been included under the table for Technical Specifications under section B.1 for better representation. Please find the revised MR version attached (version 03, dated 30-05-2019).

Documentation provided by the PP

Revised MR

DOE assessment	**Date:** 30/05/2019

As clarified by the PP above, the stated specification in the PDD as "JGS 620 GS-S.L" is for the module type of the gas engine supplied by GE Energy. The reference "J 620 GS-F57" is for the Engine type. The verification team has verified this by referring the two documents[2] /06/ provided by the technology supplier in which the above two specifications are cross referenced. Hence the verification team confirms that there is not any change in the gas engines as stated in the PDD and actually implemented. The CAR is closed.

CAR ID	CAR 03	**Section no.**	UNFCCC I & R check comments (issue 2)	**Date:** 29/05/2019

Description of CAR

The DOE is requested to explain how it verified parameter TDLgr,y. As per the description, the parameter is the average technical transmission and distribution losses for providing electricity to the grid "in year y", and this parameter is used to calculate project emissions from electricity consumption "in year y" (PEEL,y). However, as shown in the ER spreadsheet, parameter PEEL,y for the entire monitoring period is calculated using average of TDLgr,y for 5 years, instead of PEEL,y for each year being calculated using TDLgr,y of the respective year. Please refer to paragraph 360 of VVS for project activities (version 02.0).

PP response	**Date:** 30/05/2019

PP would like to inform that application of the value of "$TDL_{gr,y}$" has been now revised in line with the description of the parameter in registered PDD.

The $TDL_{gr,y}$ values are applied for PEy calculation for each year respective to the year count "April(Year1) to March(Year2)" as prescribed in the Eskom's report. However, for the months of April & May 2018, the value available for the year 2017-18 has been applied as published value for 2018-19 is not available. Please refer to the ER calculation sheet for details.

The revised ER sheet (version 03, dated 30/05/2019) is being submitted to DOE. The corresponding value of the parameter and revised ER values are included in the revised MR. Please refer to the MR version 03, dated 30/05/2019.

Documentation provided by the PP

Revised MR and ER spread sheet

DOE assessment	**Date:** 30/05/2019

[2] i. Technical Specification sheet titled "Technical specification of the control" (reference date 30.09.2011)
ii. technical data sheet (the document titled "Technical Description Genset JGS 620 GS-S.L - F57", reference date 19.01.2012)

PP has submitted revised emission reduction calculation spread sheet and revised MR in which the values of the parameter TDLgr,y have been used for emission reduction calculation for the respective year and not an average value for the whole monitoring period. The latest Eskom report available has data till the year 2017-18 (i.e. till March 2018). The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" states that "*In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years*". Hence for the months of April 2018 and May 2018, PP has used the latest available value of 7.73% from the previous year in line with the above tool which is deemed acceptable to the verification team. The closure of this CAR has reduced the emission reductions from 222,024 tCO2e in the earlier submitted MR to 222,006 tCO2e in the present submission. The CAR is closed.

Table 4. FAR from this verification

FAR ID	xx	**Section No.**		**Date:** DD/MM/YYYY
Description of FAR				
-				
Project participant response				**Date:** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

Annex 1: Assessment of data and parameters fixed ex-ante at the time of validation

Parameter	CO_2 emission factor for grid electricity displaced by the project activity during year *y*
Data unit:	tCO_2/MWh
Default values used:	1.036
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	CO_2 emission factor for electricity consumed by the project activity in year *y* (electricity is sourced from the grid).
Data unit:	tCO_2/MWh
Default values used:	1.036
Purpose of data	Project emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	Production associated with the relevant waste energy generation as it occurs in the baseline scenario
Data unit:	ton slag/year
Default values used:	169,242
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	Specific waste energy production per unit of product generated
Data unit:	Nm^3 waste energy/ton slag
Default values used:	542
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Annex 2: Assessment of data and parameters monitored

Monitoring Parameter Requirement	Assessment/ Observation by the DOE
Data / Parameter: (as in monitoring plan of PDD):	Quantity of waste gas used for energy generation during year y ($Q_{wcm,y}$)
Measuring frequency/Time Interval:	Continuous measured and aggregated monthly
Reporting frequency:	Monthly
Reported value:	224,193,154.19 Nm^3 for the monitoring period – Monnthly values are reported in the ER spread sheet (the reported value is after applying correction factor in a conservative manner due to delayed calibration of the gas flow meters)
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes

Details of monitoring equipment:	<table><tr><td>Instrument Name</td><td>Gas Flow Meter</td></tr><tr><td>Manufacturer</td><td>Gas Train - Rosemount Flare - Siemens</td></tr><tr><td>Serial Number</td><td>0053274 – Gas Train 1 0053264 – Gas Train 2 0053275 – Gas Train 3 D13000000384314 – Flare 1 D13000000389357 – Flarre 2</td></tr><tr><td>Accuracy Class</td><td>+/-0.5%</td></tr></table>
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The PDD does not specifiy the accuracy class of the gas flow meters. The verification team confirms that the accuracy class of the gas flow meters used in the project activity represent good monitoring practise.
Calibration frequency /interval: Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Annual (as per the PDD)
Company performing the calibration (internal or external calibration):	Shriram Consultants
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is (are) calibration(s) valid for the whole reporting period?	Calibration for the Gas flow meters was done in February 2019. As the annual calibration of the meters was not followed, PP has applied correction in a conservative manner for the full monitoring period which is deemed acceptable
If applicable, has the reported data been cross-checked with other available data?	Yes, the value of parameter has been cross-checked with the raw data downloaded from the DCS
How were the values in the monitoring report verified?	The values were verified with the raw data sheet and calculations in the ER spread sheets
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the DOE
Data / Parameter: (as in monitoring plan of PDD):	Quantity of electricity supplied to Namakwa Sands, which in the absence of the project activity would have sourced from the grid during the year y ($EG_{GR,y}$)
Measuring frequency/Time Interval:	Continuous measured and monthly recorded
Reporting frequency:	Monthly
Reported value:	221,528.74 MWh for the monitoring period – Monthly values are reported in the ER spread sheet
Is measuring and reporting frequency in accordance with the monitoring plan and	Yes

monitoring methodology? (Yes / No)	
Details of monitoring equipment:	<table><tr><td>Instrument Name</td><td>Electricity Meters</td></tr><tr><td>Manufacturer</td><td>Elster</td></tr><tr><td>Serial Number</td><td>81120018 – Main Meter 1 81120019 – Check Meter 1 81120020 – Main Meter 2 81120021 – Check Meter 2</td></tr><tr><td>Accuracy Class</td><td>+/-0.2%</td></tr></table>
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The PDD does not specifiy the accuracy class of the electricity meters. The verification team confirms that the accuracy class of the electricity meters used in the project activity represent good monitoring practise.
Calibration frequency /interval: Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Once in 5 years (as per manufacturer)
Company performing the calibration (internal or external calibration):	Elster
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is (are) calibration(s) valid for the whole reporting period?	Calibration for the electricity meters was done on 12/12/2013 which is valid for the full monitoring period
If applicable, has the reported data been cross-checked with other available data?	Yes, the value of parameter has been cross-checked with the raw data downloaded from the DCS
How were the values in the monitoring report verified?	The values were verified with the raw data sheet and calculations in the ER spread sheets
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	**Assessment/ Observation by the DOE**
Data / Parameter: (as in monitoring plan of PDD):	Quantity of electricity consumed by the project from the grid in year y ($EC_{Pj,gr,y}$)
Measuring frequency/Time Interval:	Continuous measured and monthly recorded
Reporting frequency:	Monthly
Reported value:	6,738.73 MWh for the monitoring period – Monthly values are reported in the ER spread sheet
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	<table><tr><td>Instrument Name</td><td>Electricity Meters</td></tr><tr><td>Manufacturer</td><td>Elster</td></tr></table>

	Serial Number	81120018 – Main Meter 1 81120019 – Check Meter 1 81120020 – Main Meter 2 81120021 – Check Meter 2
	Accuracy Class	+/-0.2%
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The PDD does not specifiy the accuracy class of the electricity meters. The verification team confirms that the accuracy class of the electricity meters used in the project activity represent good monitoring practise.	
Calibration frequency /interval: Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Once in 5 years (as per manufacturer)	
Company performing the calibration (internal or external calibration):	Elster	
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes	
Is (are) calibration(s) valid for the whole reporting period?	Calibration for the energy meters was done on 12/12/2013 which is valid for the full monitoring period	
If applicable, has the reported data been cross-checked with other available data?	Yes, the value of parameter has been cross-checked with the raw data downloaded from the DCS	
How were the values in the monitoring report verified?	The values were verified with the raw data sheet and calculations in the ER spread sheets	
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.	
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA	

Document information

Version	*Date*	*Description*
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.

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