15 MW WIND ENERGY FARM AT GOPALPURA, KARNATAKA BY HZL

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Summary:

Verification purpose: The project activity involves installation and operation of ten Suzlon make 1.5 MW Wind Electric Generators (WEGs) by Hindustan Zinc Limited (HZL) in the state of Karnataka. The cumulative capacity of the project activity is 15 MW. The electricity generated from the project activity will be exported to regional Grid.

The technology employed by the project activity converts kinetic energy in wind to mechanical energy and mechanical energy to electrical energy using wind turbine generators (WTGs). In this process, there are no greenhouse gas emissions or burning of any fossil fuels. The electricity is generated through sustainable means without causing any negative effect to the environment and therefore the technology is environmentally safe and sound.

The project activity helps to reduce the supply demand gap in the state and also helps in contributing to the sustainable development by using Wind energy as the source of power generation and reduction of GHG Emissions.

The project uses Suzlon Technology. The total emission reductions for the current monitoring period i.e. 01-Dec-2012 to 31-Dec-2016 (inclusive of both days) are 87,833 tCO_2e.

This is the second monitoring under VCS and covers the activity from 01-Dec-2012 to 31-Dec-2016 (inclusive of both dates). Project activity has Renewable crediting period of 21 years for the CDM project.

Thus VCS crediting period should be maximum of 10 years and renewed twice till end date of CDM crediting period.

The first VCS crediting period is 31-Mar-2011 to 30-Mar-2021.

Start date of crediting period for VCS verification: 31/03/2011 (Date of commissioning of first WTG)

The GHG credits from 01-Dec-2012 to 31-Dec-2016 will be claimed under VCS only. An undertaking dated 17/10/2018 from the project participant confirms that project will not claim any other scheme benefits for the concerned monitoring period.

A risk based approach has been followed to perform this verification activity. In the course of verification, 04 Corrective Action requests (CAR), 00 Clarification Requests (CLs) and 00 Forward action requests (FARs) were raised and successfully closed. The review of the Monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and PP have provided DOE with sufficient evidence to verify the fulfilment of the stated criteria of VCS.

LGAI Technological Center S.A. (Applus+ Certification) (Hereafter referred as Applus+ Certification) has been appointed by “Hindustan Zinc Limited” to perform the 2nd periodic verification of the “15 MW Wind Energy Farm at Gopalpura, Karnataka by HZL” under VCS standard and guideline version 3.7. The objective of this verification activity is to have an independent third party for the assessment of the project design, Monitoring report and Final Verification report and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against “AMS I. D., Version 17”
- the project’s monitoring plan is assessed against “AMS I. D., Version 17”
- the projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM Validation and Verification Standard version 01 for the project activity
- CDM Project Standard version 01 for the project activity
- CDM Project Cycle Procedure version 01 for the project activity
- VCS standard v3.7
- VCS program guideline v3.7

Verification is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified emission reductions (VERs).

The scope of the verification is the independent and objective review of the Monitoring report (MR). The MR is reviewed against the relevant criteria (see above) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The

verification was based on the guidance given in the CDM Validation and Verification Standard version 01 for the project activity, review against registered PD and Final Validation report, CDM Project Standard version 01 for the project activity, CDM Project Cycle Procedure version 01 for the project activity and VCS program guideline and standard version 3.7.

The assessment team has employed a risk based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VERs. The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring report combined.

The only purpose of the verification is its usage during the issuance process as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the verification opinion, which will go beyond that purpose.

The verification has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS. No sampling procedure applied for site visit or document verifications. The entire documents checked/WTGs verification conducted to arrive at positive verification conclusions.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center S.A. (Applus+ Certification) (Hereafter referred as Applus+ Certification) has been appointed by "Hindustan Zinc Limited" to perform the 2nd periodic verification of the "15 MW Wind Energy Farm at Gopalpura, Karnataka by HZL" under VCS standard and guideline version 3.7. The objective of this verification activity is to have an independent third party for the assessment of the project design, Monitoring report and Final Verification report and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against "AMS I. D., Version 17"
- the project's monitoring plan is assessed against "AMS I. D., Version 17"
- the projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM Validation and Verification Standard version 01 for the project activity
- CDM Project Standard version 01 for the project activity
- CDM Project Cycle Procedure version 01 for the project activity
- VCS standard v3.7
- VCS program guideline v3.7

Verification is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified emission reductions (VERs).

1.2 Scope and Criteria

The scope of the verification is the independent and objective review of the Monitoring report (MR). The MR is reviewed against the relevant criteria (see 1.1) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The verification was based on the guidance given in the CDM Validation and Verification Standard version 01 for the project activity, review against registered PD and Final Validation report, CDM Project Standard version 01 for the project activity, CDM Project Cycle Procedure version 01 for the project activity and VCS program guideline and standard version 3.7.

The assessment team has employed a risk based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VERs. The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring report combined.

The only purpose of the verification is its usage during the issuance process as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the verification opinion, which will go beyond that purpose.

1.3 Level of Assurance

The verification has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS. No sampling procedure applied for site visit or document verifications. The entire documents checked/WTGs verification conducted to arrive at positive verification conclusions.

1.4 Summary Description of the Project

The project activity involves installation and operation of ten Suzlon make 1.5 MW Wind Electric Generators (WEGs) by Hindustan Zinc Limited (HZL) in the state of Karnataka. The cumulative capacity of the project activity is 15 MW. The electricity generated from the project activity will be exported to regional Grid.

The technology employed by the project activity converts kinetic energy in wind to mechanical energy and mechanical energy to electrical energy using wind turbine generators (WTGs). In this process, there are no greenhouse gas emissions or burning of any fossil fuels. The electricity is generated through sustainable means without causing any negative effect to the environment and therefore the technology is environmentally safe and sound.

Wind turbines produce electricity by using the natural power of wind to drive a generator. Wind has considerable amount of kinetic energy when blowing at high speeds. When this kinetic energy passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The Project activity envisages installation of WEGs of S-82 Suzlon make (1500 kW WEGs). The WEGs generate 3-phase power at 400V, which is stepped up to 33 KV. The project can operate in the frequency range of 46–54 Hz and in the voltage range of 400 V ± 20%.

The timeline for Commission of the project activity is also checked by the assessment team. Assessment team checked the Commission of all the WTGs via the commissioning Certificates and found correct. The project is implemented as per the description in the registered PD. No event observed during the current monitoring period which can alter or deviate from the methodology requirement. The details are as below:

LOCATION No	Date of commissioning	Connected Load (MW)
GP 2,3,4,17,23,24,28,31	31/03/2011	12 MW
GP 29, 30	21/05/2011	3 MW

There was no activity at the site prior to implementation of the project activity (Greenfield). The electricity generated by the project is exported to the Indian grid. The project activity will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. Since Wind power is Greenhouse Gas (GHG) emissions free, the power generated will prevent the anthropogenic gas emissions generated by fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas.

Assessment team confirms following during the verification site visit:

1. Start date of the project activity is 31/03/2011 as mentioned in the registered VCS PD

2. An undertaking letter dated 17/10/2018 has been submitted by PP for double counting with any other GHG program. PP also has given a written declaration that project has not claimed other form of GHG credit for the concerned monitoring period. Assessment team also checked that the projects are not registered under the REC mechanism of India and the same can be cross-checked at https://recregistryindia.nic.in. PP has given a written declaration that the credit claimed under VCS for the current monitoring period is not claimed under any other GHG mechanism.

3. Assessment team confirms that this is the second monitoring under VCS and covers the activity from 01-Dec-2012 to 31-Dec-2016 (inclusive of both dates). Project activity has Renewable crediting period of 21 years for the CDM project.
   Thus VCS crediting period should be maximum of 10 years and renewed twice till end date of CDM crediting period.
   The first VCS crediting period is 31-Mar-2011 to 30-Mar-2021.
   Start date of crediting period for VCS verification: 31/03/2011 (Date of commissioning of first WTG)
   The GHG credits from 01-Dec-2012 to 31-Dec-2016 will be claimed under VCS only. At any point of time during the crediting period, the project proponent will abide by the "Double Counting

4. Assessment team checked and found that the Project proponent of the project activity is as below for the current monitoring period:

Organization name	Hindustan Zinc Limited
Contact person	Mr. V. Jayaraman
Title	VP & Head (EOHS)
Address	CPP-CLZS Chanderiya Lead Zinc Smelter, Putholi Chittorgarh-312021, Rajasthan INDIA
Telephone	91-1472-257950
Email	v.jayaraman@vedanta.co.in

5. Assessment team also checked the details of other entity and found correct. The details are as below:

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Manish Dabkara
Title	MD & CEO
Address	Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar INDORE – 452010, India.

Telephone	-
Email	manish@enkingint.org

6. The quantified emission reduction calculation for the monitoring period is correct and conservative. Assessment team also compared actual VER with the estimated VER and found that the actual VER is 32% lower than the estimated emission reduction which is due to low PLF attained by the WTGs for the current monitoring period. The current monitoring period involves variation in wind flow and this is nature dependent and not in control of PP. It is to be noted that there is no change in design of project activity as checked by the assessment team during the onsite visit and all the parameters has been monitored as per the Monitoring Plan mentioned in the Registered PDD, hence there is no any post registration changes applicable.

2 VERIFICATION PROCESS

2.1 Method and Criteria

Verification Scope: The scope is defined as an independent and objective review of the Monitoring report (MR) prepared as per the registered PD and registered approved methodology AMS I. D., Version 17. The MR is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board and VCS standard and guideline version 3.7, including the approved baseline and monitoring methodology AMS I. D., Version 17. The verification was based on the requirements in the CDM Validation and Verification Standard (VVS version 01 for the project activity), CDM project standard version 01 for the project activity, CDM project cycle procedure version 01 for the project activity and VCS program guideline and standard version 3.7

The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the Monitoring report.

Verification Process: The project assessment is based on the "Clean Development Mechanism Validation and Verification Standard" version 01 for the project activity and "VCS standard and program guideline version 3.7" and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the VCS project activity are appointed.

Once the project is received by the assessment team, the members of the assessment team carried out:

1. A desk review of the Monitoring report against the registered PD and final validation report;

2. Follow-up interviews with project participant;

3. The resolution of outstanding issues and the issuance of the final verification report and opinion.

The prepared verification report and other supporting documents then undergo an internal quality control at the HQ (Accredited office) before being submitted to the VCS executive board.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. Applus+ Certification has developed a specific checklist customized for the project. The checklist demonstrates, in a transparent manner, the project criteria (requirements), discussion on each criterion by the assessment team, and the results from validating the identified criteria.

Appointment of the assessment team

According to the sectoral scope / technical area and experience in the sectoral or national business envi ronment, Applus+Certificationhas composed a project assessment team in accordance with the appointm ent rules in the internal Quality Management System of Applus+ Certification.

The composition of audit team shall be approved by the Applus+Certificationensuring that the required ski lls are covered by the team.

The four qualification levels for team members that are assigned by formal appointment rules are as pres ented below:

●Lead Auditor (LA).

●Auditor (A) / Auditor in Training (AiT).

●Technical Expert (TE).

●Technical Reviewer (TR).

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be

Covered by the assessment team.

Name	**Role**	**SS Coverage**	**TA Coverage**	**Financial aspect**	**Host country experience**
Dr. Atul Takarkhede	LA/TE	YES	YES	NA	YES
Mr. Simon Shen	TR	YES	YES	NA	NA

The detail regarding the assessment team is provided below in this report as Appendix 3

Document review

The Monitoring report version 1 submitted by the PP was reviewed against the approved methodology, registered PD, final validation report and other relevant criteria to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done. A complete list of all documents and evidence material reviewed is included in this report below in appendix 1

Follow-up interviews

A site visit is conducted by Applus+ Certification performed interviews, telephone conferences, and physical site inspection with project stakeholders to confirm selected information and to resolve issues identified in the document review. The detail is provided in this report.

Resolution of Clarification and Corrective Action Request

The objective of this phase of the Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for Applus+ Certification positive conclusion on the Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the verification process, the concerns raised and responses given are summarized below in the appendix 2.

The final MR Version 02 submitted by PP on 19/10/2018 serves as the basis for the final assessment presented. Additional changes to the project during the verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Internal quality control

As final step of a verification of the final documentation including the verification report and the checklist have to undergo an internal quality control by the technical review committee, i.e. each report has to be finally approved either by the head of the technical review committee or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one to avoid any conflict of Interest.

After confirmation of the PP the positive verification opinion and relevant documents are submitted to the VCS board through the VCS web-platform

2.2 Document Review

The details of the document observed during the verification process are listed below in Appendix 1 of this report

2.3 Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Khandelwal	Vishnu	PP Representative	16/10/2018	Implementation of the project and monitoring. Baseline emission calculation, achieved emission reduction for the monitoring period, monitoring process followed onsite	Dr. Atul Takarkhede
2	-	Mr. S Ramachandran	Operations-In-Charge, SEL	16/10/2018	WTG operation and Local Stakeholder Consultations	Dr. Atul Takarkhede
2	Krishna	M.	Villager	16/10/2018	Local Stakeholder Consultations	Dr. Atul Takarkhede

2.4 Site Inspections

Duration of on-site inspection: 16/10/2018				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Assessment team checked the implementation of the project, Baseline emission, Emission reduction calculation, technical description of the project and Monitoring. Assessment team also checked that whether the monitoring plan as described in the VCS PD is actually practised onsite. Also assessment team checked any change in host country criteria which may affect the baseline of the project activity. Assessment team also had a discussion with Local stakeholders and checked grievance register placed onsite as per the continuous improvement measure of PP for the Local villagers.	Gopalpura, Hassan District, Karnataka, India	16/10/2018	Dr. Atul Takarkhede

2.5 Resolution of Findings

The objective of this phase of the Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues from validation which need to be clarified for Applus+ Certification's positive conclusion on the Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the verification process, the concerns raised and responses given are summarized below in the appendix 2.

The final MR Version 2 submitted by PP on 19/10/2018 serves as the basis for the final assessment presented. Additional changes to the project during the verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation and verification findings	**No. of CL**	**No. of CAR**	**No. of FAR**
Project design document and Monitoring report	00	00	00
Description of project activity	00	01	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
Applicability of methodology and standardized baseline	00	00	00

Deviation from methodology	00	00	00
Clarification on applicability of methodology, tool and/or standardized baseline	00	00	00
Project boundary	00	00	00
Establishment and description of baseline scenario	00	00	00
Demonstration of additionality	00	00	00
Emission reductions	00	01	00
Calibration details	00	01	
Monitoring plan	00	01	00
No Net harm assessment	00	00	
Local stakeholder consultation	00	00	
Others (please specify)-Matter related to breakdown details PP declaration – Related to participation in other GHG program for the monitoring period	00	00	00
Total	00	04	00

The list of findings and there resolution is presented in Appendix 2 of this report.

2.5.1 Forward Action Requests

This is 2nd periodic verification of the project activity and no FAR raised from previous 1st verification.

2.6 Eligibility for Validation Activities

This section is not applicable for present verification.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

This section is not applicable for present verification.

3.2 Methodology Deviations

This section is not applicable for present verification.

3.3 Project Description Deviations

This section is not applicable for present verification.

3.4 Grouped Project

This is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

During the verification site visit it was concluded that the project is implemented as per the requirement of the registered PD and Final Validation report. During the current monitoring period it was observed that no unforeseen incident/event evolved which can impact the operation of the project activity. The project undergone continuous operation and only scheduled maintenance is observed as per the manufactures specification which is acceptable to the assessment team.

CAR 01 is raised for the project description in Section 1.1 of the MR which was not in line with registered VCS PD and project implementation.

Also PP revised the Section 1.1 of the MR in line with the registered VCS PD & actual project implementation and found correct. CAR is closed.

Project location is confirmed by the assessment team during the site visit. Assessment team also checked with the GPS meter regarding the latitude and longitude of the project site and confirm that the details as mentioned in the registered PD are correct. The detail is as below:

Sr No.	WEG No.	Latitude	Longitude
1	GP-02	N12057'25.1"	E76017'29.0"
2	GP-03	N12057'10.2"	E76017'28.5"
3	GP-04	N12057'02.4"	E76017'26.4"
4	GP-17	N12055'11.6"	E76017'13.6"
5	GP-23	N12054'15.6"	E76016'49.0"
6	GP-24	N12054'07.5"	E76016'48.7"
7	GP-28	N12053'35.1"	E76016'47.0"
8	GP-29	N12053'27.1"	E76016'47.0"
9	GP-30	N12053'19.2"	E76016'46.4"
10	GP-31	N12053'11.1"	E76016'46.0"

Assessment team also checked the Technical details of the WTGs installed onsite. The same is checked during the onsite visit from the number plate capacity of each WTGs and also cross checked from the technical manual of the Manufactures. The detail is as below:

WTG (S82 ,1.5 MW, 50 Hz) TECHNICAL DATA

Rated capacity: 1500 kW

Rotor diameter: 82 m

Hub height: 78.5 m

Rotor with Pitch Control

Type: Upwind rotor with active pitch control

Number of blades: 3

Swept area: 5281 m²

Blade material: The rotor blades are made epoxy bonded fibre glass

Rotor speed: 16.30 rpm

Tip speed: 70 m/s

Generator:

Type: Single fed Induction Generator with slip-rings, variable rotor resistance with SUZLON-FLEXI-SLIP control system.

Hub: Cast spherical hub

Bearings: High tensile double-row ball-bearing

Braking System: 3 independent Aero Brakes with power back up supply.

Yaw Control: Active through adjustment gears, friction damping

Tower: Steel Tubular, 76 m height

Assessment team checked the commissioning certificate and confirmed that

the dates of Commission for the WTGs are correct.

The assessment team confirmed that there is no proposed or actual change to the project design during this monitoring period. The project design as mentioned in the registered PD is implemented and thus the same is acceptable to the assessment team. All required monitoring equipment's and procedures as mentioned in the registered PD are available and implemented in an appropriate manner.

The organisational role and responsibility as mentioned in the registered PD is followed onsite. All the monitoring equipment was calibrated however the specified interval of yearly calibration as per the registered PD is not followed. The delay is observed in Calibration for the current monitoring period. The error factor is applied appropriately to calculate the emission reduction conservatively. All the emergency preparedness as mentioned in the registered PD is followed onsite and no discrepancies were found regarding the same.

The project activity fulfilled the contribution of sustainable development to the host country by implementing environmental friendly technology and creating employment opportunities to the local community. Same is confirmed during site visit.

It was also observed during the verification process that project is not rejected by any other GHG program around the world. Declaration dated 17/10/2018 in that effect is also provided by PP.

Assessment team would like to clarify that the project is registered under CDM number 8303. The present monitoring period is 01-Dec-2012 to 31-Dec-2016 (inclusive of both days) and no credit is claimed from other mechanism in the present monitoring period except from VCS therefore avoiding any double counting. A written declaration is also checked by the assessment team which confirms that PP will not claim any GHG emission for the present monitoring period from any other mechanism.

It was also observed during the verification process is that project is not rejected by any other GHG program around the world. The project is registered by VCS board and the registered PD and registered FVR is used to assess the present 2nd periodic verification. The following web sites were checked to confirm the same:

1. www.v-c-s.org

Assessment team hereby also confirms from the declaration made by PP the projects are not registered under the REC mechanism of India and the same is cross-checked at https://recregistryindia.nic.in. Moreover as per state tariff policy the project is not eligible to receive REC benefits as it is selling power to State electricity grid.

The assessment team observed that the project is in line with the registered PD, FVR and approved methodology and thus no clarification/deviation is sought.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the VCS PD. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the monitoring plan of the VCS PD

Findings	CAR 02 was raised during the verification process and closed successfully. Please refer Appendix 2 of this report for the detail closure of the CAR
Conclusion	The baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. Formula Used:- $\mathbf{BE_y} = EG_{BL,y} \times EF_{CO2,grid,y}$ Where, $\mathbf{BE_y}$ baseline emissions, tCO_2e $EG_{y} = EG_{BL,y}$ Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh) $EF_{CO2,grid,y}$ grid emission factor, i.e. 0.9154 t CO_2/MWh (it has been fixed ex-ante) <u>Ex ante Parameters:</u> $EF_{CO2,grid,y}$, $EF_{grid,BM,y}$, $EF_{grid,OM,y}$ were mentioned as ex-ante fixed parameter. Assessment team checked the values, source of data, choice of data, purpose of the data mentioned in the MR from the registered PDD and confirms that the similar approach was considered for the current monitoring period also. The values for $EF_{grid,CM,y}$ = 0. 9154 tCO_2/MWh- Assessment team Confirmed that the value is as per the registered PD $EF_{grid,BM,y}$ = 0. 7634 tCO_2/MWh- Assessment team Confirmed that the value is as per the registered PD $EF_{grid,OM,y}$ = 0.9661 tCO_2/MWh- Assessment team Confirmed that the value is as per the registered PD 1. $EF_{grid,OM,y}$: Operating Margin emissions factor for grid connected power generation in year y calculated using the latest version of "Tool to calculate the emission factor for an electricity system". $EF_{grid,OM,y}$ is computed using the Simple Operating margin CO_2 emission factor. Simple Operating margin CO_2 emission factor is calculated from the weighted average CO_2 emissions per unit net electricity generation of all power plants serving the system, not including low-cost / must-run. This is in agreement with the guidance provided in the "Tool to calculate the emission factor for an electricity system". The value is considered from CEA version 06 and registered PD. Assessment team checked the registered PD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PD. Thus assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct. 2. $EF_{grid,BM,y}$: Build Margin emissions factor for grid connected power

generation in year y calculated using the latest version of "Tool to calculate the emission factor". Build margin emission factor is the generation-weighted average emission factor of all power plants m during the most recent year y for which generation data is available. The value is considered from CEA version 06 and registered PD. Assessment team checked the registered PD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PD. Thus assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct.

3. $EF_{grid,CM,y}$: Combined Margin emissions factor for grid connected power generation in year y calculated using the latest version of "Tool to calculate the emission factor for an electricity system. Combined Margin is computed using the official data sources and is in-line with the guidance provided in the tool. The value is considered from CEA version 06 and registered PD. Assessment team checked the registered PD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PD. Thus assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct.

The value for $EF_{grid,CM,y}$, $EF_{grid,BM,y}$, $EF_{grid,OM,y}$ were considered from the CO2 baseline database (Version 06) published by Central Electricity Authority (CEA). The default value as mentioned in the registered PD and MR are same. The value of combined margin in India is being given by CEA and thus assessment team conclude that the value is correct and appropriate. The default value in turn is used for baseline calculation as per the formula given in the registered PD for the current monitoring period.

<u>Ex-post parameter:</u>

As per the registered monitoring plan and requirement of the registered methodology following parameters needs to be monitored:

(a) Net electricity supplied to the grid by the project activity in year y ($EG_{BL,y}$) – This parameter is a calculated parameter, and is deduced as the difference between Electricity exported ($EG_{EXP,y}$) and electricity imported ($EG_{IMP,y}$) by the project activity. The verification team verified the net electricity supplied by all the WTG's of the project activity to the grid from the monthly Credit note issued by the State utility (RVPN) on a monthly basis. The verification team noted that the monthly energy statement also indicates the values of the electricity export and electricity import. EGBL,y = $EG_{EXP,y}$ – (1+15%) $EG_{IMP,y}$ – $EG_{TL,y}$ Based on this statement, the Project Participant raises an invoice on RVPN for payment, subsequent to which payments are made. The verification team cross-checked the values of the net electricity supplied values indicated in the energy statement with the invoices raised by the Project Participant. The verification team confirms that all the values of net electricity supplied to the grid are sourced from the monthly Credit Notes and are correct.

(b) Electricity exported from the project activity in year y ($EG_{EXP,y}$) – Electricity exported to the grid is recorded by the energy meters at substation where the all WTGs are connected. The meter readings are taken by the representatives of

	the State Electricity Utility viz; KPTCL/CESC and Project participant on a monthly basis. This value was verified from the Monthly Credit Note issued by the RVPN to the Project participant. This was further crosschecked with the invoices raised by the Project participant on KPTCL/CESC and was found to be correct. (c) Electricity imported by the project activity in year y ($EG_{IMP,y}$) - The electricity imported by the project activity from the grid is recorded by the energy meters at substation where all the WTGs are connected, which also monitors the electricity export. The meter readings are taken by the representatives of the State Electricity Utility viz; KPTCL/CESC and Project participant on a monthly basis. This value was verified from the Monthly Credit Notes issued by the KPTCL/CESC to the Project Participant. The invoices raised by Project participant has been used by the verification team as a cross-check against the primary data viz; the monthly credit notes and were found to be correct. (d) Transmission losses in year y ($EG_{TL,\ y}$): The value of transmission losses would be calculated by KPTCL/CESC officials as per the equations described in the PPA and official notifications. The value would be determined from the bulk meter readings at the substation (from where electricity is exported to grid) and from all metering points connected to the substation. The value would be reported in the JMR statements. The invoices raised by Project participant has been used by the verification team as a cross-check against the primary data viz; the monthly credit notes and were found to be correct. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors. **BE_y** baseline emissions, tCO_2e $EG_{BL,y} = EG_{EXP,y} – (1+15\%)\ EG_{IMP,y} – EG_{TL,y}$ = 98251.96 – 745.61 – 1,443.81 = 95,950.7 MWh BE_Y = 95,950.7 * 0.9154 = 87,833 tCO2 tCO2 (Rounded down) The project activity involves in harnessing Wind power. So the emissions from the project are zero. Leakage emission is not applicable as per the registered PDD. As per the applied methodology, emission reductions are calculated as follows: ERy = BEy – PEy − LEy = 87,833 tCO_2e - 0 – 0 = 87,833 tCO_2e (rounded down) Where: ERy = Emission reductions in year y (tCO2e/yr) BEy = Baseline emissions in year y (tCO2e/yr)

	PEy = Project emissions in year y (tCO2e/yr) = 0 LEy = Leakage emissions in year y (tCO2e/yr) = 0 Hence, ERy= BEy

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

Means of verification	The verification team checked the Calibration details of the monitoring meters with the calibration certificates.
Findings	CAR 04 was raised during the verification process. The description of the CAR and its closure is described below in Appendix 2 of this report
Conclusion	The metering arrangement is bi-directional energy meters (main and check) at the State Electricity Board (SEB) substation. These meters record several parameters including electricity exported & imported. These electricity meters are being used by state electricity board for Share certificate statements. Assessment team found that Since metering arrangement, monitoring practice, accuracy class, calibration interval is under control of state electricity board, the PP does not have all calibration certificates available with them. As per the registered monitoring plan, the energy meters have to be calibrated annually. It is to be noted here that due to delay in calibration, error factor has been applied on import and export values to retain conservativeness for the month of Dec. 2012 & July 2014 to May 2015. The details of the Calibration is presented in Appendix 5 Assessment team confirms that all the energy meters (both main and check meter) installed at the substation are of accuracy class of 0.2s and are calibrated as per the national standards followed by the electricity board, but they are not calibrated at least once in a year. There were delay in calibration and appropriate error factor is applied for the same for the concerned month. The calibration of the energy meters installed at HT side of the transformer were carried out by CESC and the same is acceptable to the assessment team and thus traceability of the Calibration is also confirmed by the assessment team.

4.4 Non-Permanence Risk Analysis

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	
NA	NA	NA	NA	NA

5 SAFEGUARDS

5.1 No Net Harm

No potential environment or socio-economic matter was found during the site visit. The project is renewable energy project and thus no negative impact observed onsite.

The project activity promotes environmental and socio-economic well-being as it results in zero GHG emissions due to installation and operation of clean, renewable energy technology for electricity generation. The report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects" prepared by MNRE dated September 2013. This report clearly mentioned that Wind power project activity operations do not result in direct air pollution, noise pollution. Moreover, also as per the Central Pollution Control Board of India notification[1] wind project falls under White Category and are practically non-polluting.

However, assessment team still conducted the No net harm assessment for some of the parameters and the result is described below.

SL.NO	Indicator	Assessment team opinion
1	Air quality	The project generates clean energy which replaces the fossil fuel intensive electricity generation. Also report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects" prepared by MNRE dated September 2013. This report clearly mentioned that Wind plant operations do not result in direct air pollution. Adequate measures were taken to mitigate the envisaged impacts like spraying water on the road side to reduce dust level, etc. This was confirmed by the local stakeholders. Therefore, it is validated that mitigation measures were robustly implemented on ground for air quality issues project will have a positive impact on air quality.
3	Soil condition	There are negligible impacts envisaged during operation of the project activity. For mitigating the impacts during construction, various mitigation measures were taken which is validated from the plant records of PP and the interview with local villagers. The top soil excavated during construction, was stockpiled and used for compaction. The roads were not paved and soling was done with excavated earth & rock material, so land disturbance could be minimized. It was also confirmed that, the vegetation done at site helps for soil erosion. The same is confirmed during the stakeholder meetings during onsite visit. Therefore, it can be concluded that the project has no effect on soil conditions during its operation because it has no waste coming out.

[1] http://envfor.nic.in/sites/default/files/Latest_118_Final_Directions.pdf

4	Biodiversity	During the validation site visit it was observed that the condition of ground vegetation will be gradually improved; No rare species has been found in the around area. The project site is not on the migration route of migratory bird. As Such Wind plant do not have any obstruction in the path of migratory birds. With the implementation of Project, the greening water will be increased significantly; the biodiversity in the vicinity will be improved with the vegetation improvement. No negative impact envisaged.
5	Employment Generation	The project activity employed local population as skilled workers as well as security guards which were envisaged during the validation site visit. The personnel employed by the project activity are also provided trainings and exposed to various awareness programs therefore a positive indicator has been accepted.
6	Livelihood of the poor	The project is associated with infrastructure development like roads in the nearby areas and promoting economic activities like grants to local school and communities temples etc. Also, project employed local villagers as guards for the security of power project. Positive impact envisaged. .

5.2 Local Stakeholder Consultation

All the stakeholders are happy with the implementation and operation of the project activity and no negative comments envisaged for the project activity. There was no change in technical project description form the registered VCS PD. Assessment team confirmed the same during the verification site visit. Also, as best practice method PP also placed a grievance register onsite to record any grievance from the stakeholders during and after the implementation of the project activity. Assessment team checked the grievance register maintained onsite and no negative comments were observed for the project activity. Local people are happy as the project generated employment opportunities and thus the living standards in and around the vicinity of the project is increased and thus assessment team confirms that local stakeholders have no issue with this project activity after implementation and continuous operation.

The interaction with some of the stakeholders during the site visit is presented below:

Name of the stakeholder	Mr. S Ramachandran
Occupation	Operation Incharge
DOE QUESTION: Did due to project activity employment opportunity increased? Answer: Yes, due to project activity local employment opportunities increased. DOE also like to conclude that during the site visit it was observed that local people were employed for security and operation related work like water spraying, vegetation improvement and other unskilled work. DOE also found that skilled local persons were also employed by the organization for the operation and maintenance of the power plant.	

Name of the stakeholder	M. Krishna
Occupation	Villager
DOE questions: Did the WTGs have any harmful impacts on nearby area? Answer: NO the plant does not have any harmful impact on the area.	

DOE questions: Did the windmills have any adverse impact on crop fields? Answer: The plant is implemented in barren land and there were no any fertile land or crop which is damaged.

6 VERIFICATION CONCLUSION

Applus+ Certification has been engaged by Hindustan Zinc Limited to perform the 2nd periodical verification of the "15 MW Wind Energy Farm at Gopalpura, Karnataka by HZL"

The management of Hindustan Zinc Limited is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the registered VCS PD and the applied methodology AMS I. D., Version 17

Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification team can confirm that:

- the project is operated as planned and described in the project document;
- the monitoring plan is as per the applied methodology;
- the monitoring process in Monitoring Report is as per the PD
- the development and maintenance of records and reporting procedures are in accordance with the monitoring plan;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

Verification period: 01-Dec-2012 to 31-Dec-2016 (inclusive of both days)

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2012	1,763	0	0	1,763
2013	23,145	0	0	23,145
2014	21,315	0	0	21,315
2015	19,241	0	0	19,241
2016	22,369	0	0	22,369
Total	**87,833**	**0**	**0**	**87,833**

APPENDIX 1: DOCUMENTS REVIEWED OR REFERENCED (VERIFICATION)

No.	Author	Title	References to the document	Provider
1	NA	Commissioning certificates of the WTGs implemented in the project site.	NA	Project participant
2	NA	Contract of the project participant with the DOE	Contract document signed between PP and DOE	Project participant
3	NA	Technical specifications of WTGs generators from manufacturers	Manufacturer technical specifications	Project participant
4	NA	RegisteredVCS PD dated 22/11/2013 version 3. https://www.vcsprojectdatabase.org/#/project_details/1139	NA	Project participant
5	NA	Registered Final Validation report 16/02/2011 version 01 Final Verification report (1st periodic)- dated 25/11/2013 version 02 https://www.vcsprojectdatabase.org/#/project_details/1139	NA	Project participant
6	NA	Emission Calculation sheet version 01 Emission Calculation sheet version 02	ER sheet Dated 27/09/2018 ER sheet Dated 27/10/2018	Project participant
7	NA	The operational lifetime of the project activity from the manufacturer=(Technical specefications)	Manufacturer technical specifications	Project participant
8	NA	RBI: Reserve Bank of India www.rbi.org.in Ministry of Environment and forest: www.envfor.nic.in UNFCCC www.cdm.unfccc.int CEA: Central electricity authority www.cea.nic.in Income tax act 1961 http://law.incometaxindia.gov.in/DIT/ VCS: Verified Carbon Standard www.v-c-s.org	Reference link is provided.	Independent Search
09	NA	Tools/ guidelines used in the project activity • Tool to determine the remaining lifetime of the project activity in line with Annex 15 EB 50 • Tool to calculate the emission factor for an electricity system (Version 02.2.1) • Tool for the demonstration and assessment of additionality (Version 06.0.0) • Glossary of CDM terms version 07 • VCS verification report template version 03	UNFCCC CDM/VCS web site	UNFCCC

10	NA	Share reports/Monthly statement for the complete monitoring period	Share reports/Monthly statement for the complete monitoring period	PP
11	NA	MR version 01 MR version 02	27/09/2018 30/10/2018	PP
12	NA	Invoices for the complete monitoring period	Invoice	PP
13	NA	Break down details of the complete monitoring period	Log sheet	PP
14	NA	Declaration regarding no participation in other GHG program for the concerned monitoring period	Declaration dated 17/10/2018	PP

APPENDIX 2: CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS (CAR/CL/FAR)

Project Implementation Status

CAR ID	01	**Section no.**	1.1 of VCS MR	**Date:** 16/10/2018
Description of CAR				
Project description in Section 1.1 of the MR is not in line with registered VCS PD and project implementation. Corrections requested.				
Project participant response				**Date:** 17/10/2018
MR Version 02 has been revised as per the CAR raised				
Documentation provided by project participant				
MR Version 02				
DOE assessment				**Date:** 21/10/2018
Description of the project activity and no of WTGs in project activity is now corrected in both sections as above. CAR closed.				

Accuracy of GHG Emission Reduction and Removal Calculations

CAR ID	02	**Section no.**	3.2 & 4 of VCS MR	**Date:** 16/10/2018
Description of CAR				
The net electricity exported by the project activity and GHG emissions achieve dare reserved for submission of JMR for the complete monitoring period.				
Project participant response				**Date:** 17/10/2018
JMR and ER sheet has been submitted for the complete verification period				
Documentation provided by project participant				
JMR and ER sheet				
DOE assessment				**Date:** 21/10/2018
PP has submitted JMR and checked with submitted ER sheet. Found correct hence CAR closed.				

CAR ID	03	**Section no.**	3.3 of VCS MR	**Date:** 16/10/2018
Description of CAR				
Metering arrangement line diagram is missing in the section. Further, apportioning calculation formula is not clear due to bad formatting. Corrections requested.				
Project participant response				**Date:** 17/10/2018
Line diagram for metering arrangement is depicted in MR Version 02. Further apportioning procedure has been described clearly in MR Version 02				
Documentation provided by project participant				
MR Version 02				
DOE assessment				**Date:** 21/10/2018
PP submitted revised MR with appropriate corrections. CAR closed.				

Quality of Evidence to Determine GHG Emission Reductions and Removals

CAR ID	04	**Section no.**	VCS MR	**Date:** 16/10/2018
Description of CAR				
PP requested to submit calibration certificates for all monitoring meters and compliance of annual calibration frequency.				
Project participant response				**Date:** 17/10/2018
Calibration reports and their details has been mentioned in the MR Version 02				
Documentation provided by project participant				
Calibration Reports MR Version 02				

DOE assessment	**Date:** 21/10/2018
PP submitted all the calibration certificates. Same are checked and found that for delayed period appropriate error factor has been applied conservatively. CAR closed.	

APPENDIX 3: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

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 review	On-site inspection	Interview(s)	Verification findings
1.	Lead Auditor/Technical Expert	OR	Takarkhede	Atul	TQC-Outsourced entity	Yes	Yes	Yes	Yes

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 (TR)	EI	Shen	Simon	Applus+ Certification
2.	Approver	IR	Sendin	Juan	Applus+ Certification B.U. Managing Director

Short CVs of the Team:

1. Dr. Atul Takarkhede counts with 9 years of experience in field of Environmental Auditing, consulting and accreditation. He is an Expert in ISO 9001-14001, CO2/GHG Reporting, Carbon Foot Print, Energy, Water and Waste Management Reporting for organizations environmental performance. His professional portfolio is mainly related with carrying out EIA, conducting QA/QC of EIA Reports; Conducting Environmental/water Audits; NABET requirements appliance. Furthermore, he counts with solid experience on CDM-VCS-GS consultancy and auditing. He has Ph.D. (Environmental Science) from Institute of Science, RTM Nagpur University, Nagpur, and he has already published different technical reports related to environmental science. Currently he is associated with True Quality Certifications Private Limited and is empanelled with APPLUS certification to carry out GHG audit.

2. Meng (Simon) Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ LGAI for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ LGAI, he had been worked for TÜV SÜD as a GHG Validator/Assessment team and ISO 9001/14001 Lead Auditor for 3.5 years

APPENDIX 4: ABBREVIATIONS

Abbreviations	Full texts
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CEA	Central Electricity Authority
CL	Clarification request
CM	Combined Margin
CMS	Central Monitoring system
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming potential
RBI	Reserve Bank Of India
PP	Project Participant

APPENDIX 5: CALIBRATION DETAILS OF THE METERS

Serial No	Location No	Calibration Date	Validity	Calibration Date	Validity	Calibration Date	Validity	Calibration Date	Validity
11068520	G 04, G 03, G 02	06/08/2012	05/08/2013	10/07/2013	09/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017
11068533		06/08/2012	05/08/2013	10/07/2013	09/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017
11068516	G 17	15/12/2012	14/12/2013	09/07/2013	08/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017
11068503		15/12/2012	14/12/2013	09/07/2013	08/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017
11068511	GP 23, GP 24	15/12/2012	14/12/2013	10/07/2013	09/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017
11068519		15/12/2012	14/12/2013	10/07/2013	09/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017
11068522	G 31	15/12/2012	14/12/2013	10/07/2013	09/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017
11068527		15/12/2012	14/12/2013	10/07/2013	09/07/2014	22/05/2015	21/05/2016	21/05/2016	20/05/2017

Assessment team found that since metering arrangement, monitoring practice, accuracy class, calibration interval is under control of state electricity board, the PP does not have all calibration certificates available with them.

As per the registered monitoring plan, the energy meters have to be calibrated annually. It is to be noted here that due to delay in calibration, error factor has been applied on import and export values to retain conservativeness for the month of Dec. 2012 & July 2014 to May 2015.