



46 MW MANGOLI WIND POWER PROJECT IN KARNATAKA



Document Prepared By

LGAI Technological Center S.A. (Applus+ Certification)

Project Title	46 MW Mangoli Wind Power Project in Karnataka
Version	01
Report ID	A+SH_SYST_TQC_VCS_VER_28021

Report Title	46 MW Mangoli Wind Power Project in Karnataka
Client	Vena Energy KN Wind Power Private Limited ¹
Pages	31
Date of Issue	16-June-2022
Prepared By	LGAI Technological Center, S.A. (Applus+ Certification)
Contact	Campus UAB – Ronda de la Font del Carme, s/n 08193 Bellaterra – Barcelona Spain) Tel: +34 93 567 20 08

¹ Formerly known as “Energon KN Wind Power Private Limited”

	Fax: +34 93 567 20 01 www.appluscertification.com agustin.calle@applus.com carla.debat@applus.com
Approved By	LGA Technological Center S.A. (Applus+ Certification) VVB Technical Manager – Mr. Agustín Calle de Miguel
Work Carried Out By	Mr. Pankaj Kumar- Lead Auditor / Technical Expert

Summary:

Verification purpose: LGA Technological Center S.A. (Applus+ Certification) (Hereafter referred as Applus+ Certification) has been appointed^{/2/} by “Energon KN Wind Power Private Limited” to perform the 3rd periodic verification of the “46 MW Mangoli Wind Power Project in Karnataka” (VCS ID 1771)^{/4/}. The main purpose of this verification activity is to have an independent third party for the assessment of the project design, monitoring report to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements.

The purpose of the project activities to generate energy electricity by the utilization of wind energy and further selling the generated energy to the Indian grid. In this process there is no consumption of any fossil fuel and hence it does not lead to any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment.

The project activity is installation of 46 MW wind power project, promoted by Energon KN Wind Power Private Limited (Name changed to Vena Energy KN Wind Power Private Limited). The project consists of 23 numbers of Vestas V110 Wind Turbine Generators (WTGs) of 2.0 MW capacity each. The project WTGs are installed in the villages Mangoli & Hegadihala in Bijapur district of Karnataka in India. All the WTGs involved in the project activity were commissioned on 23-July-2016.^{/01/}. The monitoring period for this VCS verification 01-December-2019 to 31-December 2021 (including both days) and the project activity achieved 265,866 tCO_{2e} emission reductions during this monitoring period thereon displaced 254,598 MWh amount of electricity from the generation-mix of power plants connected to the Indian Grid, which is mainly dominated by thermal/fossil fuel-based power plant.

The scope of the verification is the independent and objective review of the Monitoring Report (MR)^{/6/}. 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 for project activities, version 03.0^{/15/}, review against approved joint PD & MR^{/4/} and Final Validation report, CDM validation and verification standard for project activities, version 03.0^{/15/}, VCS program guideline version 4.1^{/10/} and VCS Standard Version 4.2^{/10/}

A risk-based approach has been followed to perform this verification activity. In the course of verification, 05 Corrective Action request (CAR) and 00 Clarification Requests (CLs) were raised and successfully closed. No FAR was raised during this verification. 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 LGAI Technological Center S.A. (Applus+ Certification) with sufficient evidence to verify the fulfilment of the stated criteria of VCS.

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 VCUs. 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 document verifications. The entire documents checked/verification conducted to arrive at positive verification conclusions.

CONTENTS

1	Introduction	6
1.1	Objective	6
1.2	Scope and Criteria	6
1.3	Level of Assurance.....	7
1.4	Summary Description of the Project	7
2	Verification Process.....	7
2.1	Method and Criteria.....	7
2.2	Document Review	9
2.3	Interviews.....	10
2.4	Site Inspections.....	10
2.5	Resolution of Findings	10
2.6	Eligibility for Validation Activities	12
3	Validation Findings.....	12
3.1	Participation under Other GHG Programs	12
3.2	Methodology Deviations.....	12
3.3	Project Description Deviations.....	12
3.4	Grouped Project	12
4	Verification Findings.....	13
4.1	Project Implementation Status	13
4.2	Safeguards	17
4.3	AFOLU-Specific Safeguards	18
4.4	Accuracy of GHG Emission Reduction and Removal Calculations	18
4.5	Quality of Evidence to Determine GHG Emission Reductions and Removals	20
4.6	Non-Permanence Risk Analysis.....	21
5	VERIFICATION CONCLUSION.....	22
	APPENDIX 1: Documents Reviewed or Referenced (Verification)	24
	APPENDIX 2: CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS (CAR/CL/FAR)	25
	APPENDIX 3: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS.....	28

APPENDIX 4: ABBREVIATIONS	30
--	-----------

1 INTRODUCTION

1.1 Objective

LGAI Technological Center S.A. (Applus+ Certification) (Hereafter referred as Applus+ Certification) has been appointed by “Energon KN Wind Power Private Limited” to perform the 3rd periodic verification of the “46 MW Mangoli Wind Power Project in Karnataka” under guideline version 4.1 and VCS standard Version 4.2. 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 ACM0002 of version 19.0 /^{19/}
- The project's monitoring plan is assessed against “ACM0002 of version 19.0 /^{19/}
- 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 version 4.1/^{10/} and standard Version 4.2/^{10/}
- CDM validation and verification standard for project activities, Version 03.0/^{15/}
- VCS program guideline v 4.1/^{10/}
- VCS standard v 4.2/^{10/}

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.

1.2 Scope and Criteria

The scope is defined as an independent and objective review of the Monitoring report (MR)^{6/} prepared as per the approved joint PD & MR /^{4/} and registered approved methodology OACM0002 of version 19.0 /^{19/}. 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 Version 4.2/^{10/} and guideline version 4.1/^{10/}, including the approved baseline and monitoring methodology OACM0002 of version 19.0 /^{19/}. The verification was based on the requirements in the CDM validation and verification standard for project activities, Version 03.0/^{15/} and VCS program guideline version 4.1/^{10/} and VCS Standard Version 4.2/^{10/}

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. In line with Guidelines for Application of materiality in verifications, the verification team has conducted a complete verification of all the information presented in the monitoring report and data monitored as presented in the emission reduction

calculation spread sheet. It follows the paper trail back to the raw data such as meter reading records and invoices. There are no material errors, overestimation of ER, omission or misstatement. Verification team conducted site visit due to verify metering/monitoring arrangement. The verification team has reviewed all the documents like commissioning certificates/^{1/}, technical specification/^{3/}, O&M practices, Share Certificates/JMR/^{11/}, invoices/^{11/}, grievance register/^{15/} etc.

1.3 Level of Assurance

Applus + Certification has planned and performed the verification by obtaining evidence and other information and explanations that assessment team considers necessary to give reasonable assurance that reported estimated GHG emission reductions are fairly stated. All documentary evidences were checked, a site audit was conducted to verify metering/monitoring arrangement to arrive at a verification conclusion by the assessment team.

In our opinion, the estimated GHG emissions reductions were calculated correctly on the basis of the approved baseline and monitoring methodology “ACM0002 of version 19.0”/^{19/} and the VCS Standard Version 4.2/^{10/}.

1.4 Summary Description of the Project

The project activity is a wind-based power generation project. The project activity involves installation of 23 numbers of Vestas V110 Wind Turbine Generators (WTGs) of 2.0 MW capacity each), which makes total capacity of project activity of 46 MW installed in the villages Mangoli & Hegadihala in Bijapur district of Karnataka in India. The Project activity is promoted by promoted by Energon KN Wind Power Private Limited (Name changed to Vena Energy KN Wind Power Private Limited). The monitoring period this VCS verification covered from 01-December-2019 to 31-December-2021 (inclusive of both dates) and the project activity achieved 265,866 tCO_{2e} emission reductions during this monitoring period. All the WTGs of the project activity were commissioned on 23-July-2016. Assessment team checked the Commissioning status of the project activity with the commissioning Certificates and found correct. The project is implemented as per the description in the approved joint PD & MR. No event observed during the current monitoring period which can alter or deviate from the methodology requirement.

2 VERIFICATION PROCESS

2.1 Method and Criteria

Verification Process: The project assessment is based on the “CDM validation and verification standard for project activities, Version 03.0/^{15/} and “VCS standard Version 4.2/^{10/}, program guideline version 4.1/^{10/}” 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/^{15/} against the approved joint PD & MR/^{04/} and final validation report/^{16/};
2. Site Visit;
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 environment, Applus+Certification has composed a project assessment team in accordance with the appointment rules in the internal Quality Management System of Applus+ Certification.

The composition of audit team shall be approved by the Applus+Certification ensuring that the required skills are covered by the team.

The four qualification levels for team members that are assigned by formal appointment rules are as presented 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
Mr. Pankaj Kumar	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 01/⁰⁶/ submitted by the PP was reviewed against the approved methodology/¹⁹/, approved joint PD & MR/⁰⁴/, 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.

Site Visit

An Onsite Inspection is conducted by Applus+ Certification. Audit team performed physical interview 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 02/⁰⁶/ submitted by PP 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.	Naik	Mr. Raghavendra	Vena Energy KN Wind Power Private Limited	13-April-2022	Project Implementation, JMR & invoicing procedure, calibration, grievance mechanism, Management practices, data storage, QA/QC	Mr. Pankaj Kumar
2.	Kumar Patil	Mr. Hareesh	Vena Energy KN Wind Power Private Limited			
3.	Deivendra	Mr. Jabastin	Site-in-charge, Vestas			
4.	R.	Mr. Narendra	Kosher Climate India Pvt limited		GHG calculations, MR and ER preparation, Data collection, data storage, QA/QC	

2.4 Site Inspections

Duration of on-site inspection: 13-April-2022 (Via video conferencing)				
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.	Bijapur district of Karnataka State, India	13-April-2022	Mr. Pankaj Kumar

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 verification 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 02/06/ submitted by PP 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	02	00
Description of project activity	00	00	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	00
Monitoring plan	00	00	00
No Net harm assessment	00	00	00
Local stakeholder consultation	00	01	00
Others (please specify	00	00	00
Total	00	05	00

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

2.5.1 Forward Action Requests

This is 3rd periodic verification of the project activity and no FAR was raised from validation and previous verification.

2.6 Eligibility for Validation Activities

This section is not applicable for present verification, as Applus+ Certification holds the accreditation for Validation of projects under this Sectoral Scope.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project is not applied under any other GHG program like CDM, GS. hence not applicable. Assessment team verified the same with other GHG mechanism's project interface. Moreover, PP has also submitted an officially attested declaration letter /¹²/to assessment team regarding no participation in other GHG program for the concerned monitoring period. Found acceptable.

3.2 Methodology Deviations

This section is not applicable for present verification as no methodology deviation sought during this verification by project participant. Further no deviation obtains by PP during previous verification too.

3.3 Project Description Deviations

During this verification it was observed that the project activity is implemented as per the approved VCS PD. Further, this is 3rd periodic verification and no project description deviation was sought during previous monitoring period and also during this monitoring period. However, in this verification PP has proposed name change of the PP and provided Incorporation certificate pursuant to the name change dated 14-September-2018 issued by Ministry of Corporate Affairs, Govt. of India. VVB verified the certificate and confirmed that name change does not have any implication on project design, baseline and additionality and ownership of the project.

3.4 Grouped Project

This is not a grouped project. Thus, this section is not applicable.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

During the Onsite Inspection with PP representatives & plants in-charge and subsequent document verification; commissioning certificates, PPA, JMR and invoices, it was concluded that the project is implemented as per the requirement of the approved joint PD & MR and approved monitoring plan. During the current monitoring period, it was observed that no unforeseen incident/event evolved which can impact the operation of the project activity which was verified from breakdown records. The project undergone continuous operation and only scheduled maintenance is observed as per the manufactures specification which is acceptable to the assessment team and evident from JMRs. The project activity is a 46 MW project and locations of the same are confirmed by the verification team during the Onsite Inspection. The plant location including latitudes and longitudes are confirmed below:

S.No	WTG No	Village	Taluk	District	Latitude	Longitude
1	Loc-1	Mangoli	Basavana Bewadi	Bijapur	16.662860	75.840409
2	Loc-2	Mangoli	Basavana Bewadi	Bijapur	16.668194	75.840142
3	Loc-3	Mangoli	Basavana Bewadi	Bijapur	16.670061	75.847783
4	Loc-4	Hegadihala	Bijapur	Bijapur	16.674754	75.845131
5	Loc-5	Mangoli	Basavana Bewadi	Bijapur	16.675373	75.839536
6	Loc-6	Hegadihala	Bijapur	Bijapur	16.676985	75.843378
7	Loc-7	Mangoli	Basavana Bewadi	Bijapur	16.680614	75.842325
8	Loc-8	Mangoli	Basavana Bewadi	Bijapur	16.685977	75.841392
9	Loc-9	Mangoli	Basavana Bewadi	Bijapur	16.695548	75.841743
10	Loc-10	Hegadihala	Bijapur	Bijapur	16.698493	75.844476
11	Loc-11	Mangoli	Basavana Bewadi	Bijapur	16.701300	75.843250
12	Loc-12	Mangoli	Basavana Bewadi	Bijapur	16.688500	75.829933
13	Loc-13	Mangoli	Basavana Bewadi	Bijapur	16.692902	75.825638
14	Loc-14	Mangoli	Basavana Bewadi	Bijapur	16.696307	75.826131
15	Loc-15	Mangoli	Basavana Bewadi	Bijapur	16.701433	75.832728

16	Loc-16	Mangoli	Basavana Bewadi	Bijapur	16.706362	75.832121
17	Loc-17	Hegadiha la	Bijapur	Bijapur	16.703868	75.827411
18	Loc-18	Hegadiha la	Bijapur	Bijapur	16.709387	75.837377
19	Loc-19	Mangoli	Basavana Bewadi	Bijapur	16.711336	75.849307
20	Loc-20	Mangoli	Basavana Bewadi	Bijapur	16.716030	75.839704
21	Loc-21	Mangoli	Basavana Bewadi	Bijapur	16.715510	75.825088
22	Loc-22	Mangoli	Basavana Bewadi	Bijapur	16.712659	75.826126
23	Loc-23	Mangoli	Basavana Bewadi	Bijapur	16.708829	75.823108

Verification team confirmed from the VCS approved joint PD& MR^{4/} and from previous verification reports^{17/} that the location of the project activity including the coordinates is same as mentioned in the approved joint PD& MR^{4/}.

All the WTGs of the project activity were commissioned on 23-July-2016. Assessment team checked the commissioning certificate^{1/} and confirmed that the dates of Commissioning for the WEGs are correct. Assessment team also conform during interview with the PPs representatives that there is no change in project design and the project is implemented as per the description provided in the VCS PD. The details of WEGs are provided below:

The project boundary includes the electricity generation equipment at the project site, substation and the regional grid (now Indian grid).

Assessment team also checked the Technical details of the wind turbines installed onsite from documents submitted by PP and previous verification reports. The same is cross checked from the photographs of the number plates, module capacity etc. submitted by PP & also cross checked from the technical details from Manufacturer.

Vestas V110	
Rated power	2000 kW
Average Annual Wind speed	7.5 m/s
Turbulence Intensity I15%	18 m/s
Reference 10-minute wind speed for 50 years	37.5 m/s
Survival wind speed	52.5 m/s
POWER	
Rated power	2000 kW

Average Annual Wind speed	7.5 m/s
Turbulence Intensity I15%	18 m/s
Reference 10-minute wind speed for 50 years	37.5 m/s
Survival wind speed	52.5 m/s
GENERATOR	
Type	Doubly-fed with coil rotors and slip rings
Rated power	2.0 MW
Voltage	690 V AC
Frequency	50Hz/60Hz
Protection class	IP 54
Power Factor	0.95 CAP – 0.95 IND throughout the power range
ROTOR	
Diameter	97 m
Swept area	7390 sq.m
Speed range (variable)	9:19 rpm
TOWER AND FOUNDATION	
Hub height	104 m
Design	Tubular, Four sections
Foundation type	Floating foundation
GEAR BOX	
Type	1 Planetary stage & 2 Parallel stage
Ratio	1:106.8 (50 Hz), 1:127.2 (60 Hz)

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 approved joint PD & MR is implemented and thus the same is acceptable to the assessment team. All required monitoring equipment's and procedures as mentioned in the approved joint PD & MR are available and implemented in an appropriate manner.

The organisational role and responsibility as mentioned in the approved joint PD & MR^{/4/} is followed onsite confirmed during onsite visit. All the emergency preparedness as mentioned in the VCS approved joint PD& MR^{/4/} is followed onsite and no discrepancies were found regarding the same. Meters are calibrated as per calibration frequency in registered VCS approved joint PD & MR^{/4/}. All the emergency preparedness as mentioned in the VCS approved joint PD & MR^{/4/} is followed onsite and no discrepancies were found regarding the same. Thus, completeness of the monitoring plan confirmed and there are no any material discrepancies between the actual monitoring system and the plan provided in the approved PD& MR.

CAR 01 is raised for the inconsistency with respect to MR template guidelines and CAR 02 is raised for supporting evidences for No-Double counting and closed successfully after proper response of PP.

Assessment team confirms following during the verification Onsite Inspection:

1. Start date of the project activity is 23-April-2006 as mentioned in the registered VCS approved joint PD& MR^{/4/}.
2. An undertaking letter dated 20-April-2022 has been submitted by PP for no 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^{/12/}.
3. Assessment team confirms that this is the 3rd monitoring under VCS and covers the activity from 01-December -2019 to 31-December-2021 (inclusive of both dates). The project activity adopts renewable crediting period of 10 years period and can be renewed for maximum 2 times. The project start date for this project is 23-July-2016. This is the day on which the first WTG was commissioned^{/6/}.

The GHG credits from 01-December -2019 to 31-December-2021 will be claimed under VCS only. At any point of time during the crediting period, the project proponent will abide by the "No Double Counting"^{/12/}.

4. Assessment team checked and found that the Project proponent of the project activity mentioned in Section 1.3 of monitoring report is correct^{/6/}:
5. Assessment team also checked the details of other entity mentioned in Section 1.4 of monitoring report and found correct^{/6/}.
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 265,866 tCO₂e which is 5.9 % higher than the estimated emission reductions 251,080 tCO₂e (120,268 tCO₂e/365 days x 762 days) during this monitoring period which is due high wind availability during the monitoring period which is a natural phenomenon and beyond the control of the Project Proponent and also the increase is within the sensitivity limit considered in the additionality as specified in the approved VCS joint PD & MR. Hence, this change will not affect the additionality of the project. The VVB confirms that these doesn't have impact on additionality and it is below the bench march. Hence accepted^{/6/}.

Sustainable development indicators

As a part of regional development efforts associated with the project, PP has supported many education, health & infrastructure related needs for local people. These are funded from the revenue generated from the operation of the project activity. In the absence of project activity, there would be no revenue generated from the project and hence the activity would have not occurred in the absence of the project activity.

Thus, the project activity contributes to the sustainable development of the country.

4.2 Safeguards

4.2.1 No Net Harm

No potential environment or socio-economic matter was found during the documents review of VCS PD and grievance register etc. The project is renewable energy project and thus no negative impact observed due to project activity.

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 2013². This report clearly mentioned that solar/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 notification³ solar/wind project falls under White Category and are practically non-polluting.

4.2.2 Local Stakeholder Consultation

Local stakeholder consultation has been conducted at the time of project registration. For on-going stakeholder's communication, PP have maintained grievance register/^{15/} at the site office. All the stakeholders are happy with the implementation and operation of the project activity and no negative comments envisaged for the project activity. Complaint/suggestion/feedback register is maintained at site as a part of ongoing communication with stakeholders in line with clause 3.16.17 of VCS Standard, ver. 4.2/^{10/} and appropriate actions taken time to time by PP.

Assessment team checked the grievance register/^{14/} provided by PP and found that local stakeholders can anytime lodge their grievances if any in the register over the operational life time of the project. During current monitoring period no grievance was received. Thus, assessment team is of the opinion that the ongoing stakeholder mechanism is adequate and appropriate. CAR 03 was raised during the verification process and closed successfully. Please refer Appendix 2 of this report for the detail closure of the CAR.

² <https://smartnet.niua.org/sites/default/files/resources/report-on-developmental-impacts-of-RE.pdf>

³ http://envfor.nic.in/sites/default/files/Latest_118_Final_Directions.pdf

4.3 AFOLU-Specific Safeguards

This section is not applicable as this project activity is a non-AFOLU project activity.

4.4 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 ^{4/} .
Findings	CAR 04 was raised during the verification process and closed successfully. Please refer Appendix 2 of this report for the detail closure of the CAR.
Conclusion	Baseline Emissions: The baseline Emissions for a given year is calculated by multiplying the energy baseline with the grid emission factor. The grid in this case would be the 'Indian Grid' Formula Used: - $BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ Where, BE_y = Baseline Emissions in year y, tCO₂ $EG_{PJ,y}$ = $EG_{facility,y}$ = Electricity exported to the grid by the Project MWh/yr $EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO₂/MWh) Ex-ante parameters: The baseline emission factors are taken ex-ante in line with the approved VCS joint PD & MR as well as cross checked with section validation report and found correct^{4/}. The baseline emission factors are calculated by the Central Electricity Authority, Govt. of India. The values of OM and BM are sourced from the CEA CO₂ Baseline database version 13. The data Combined margin CO₂ emission factor ($EF_{grid,CM,y}$) is equal to 0.9475tCO₂/MWh. The calculation approach was in line with the VCS PD. Values are as follows: $EF_{grid,OM,y} = 0.9726 \text{ tCO}_2/\text{MWh}$ $EF_{grid,BM,y} = 0.8723 \text{ tCO}_2/\text{MWh}$ Ex-post parameter: $EG_{facility,y}$:- Electricity exported to the grid by the Project (MWh) : 254,598 MWh

	This is a calculated parameter based on the difference between calculated values of “export”, “import” and “transmission loss” (Net Electricity = Export – Import – Transmission Loss). The verification team has checked the entire monthly JMR reports & share certificate ^{/11/} for net electricity generated & supplied to the grid and crosschecked same with the invoices^{/11/} raised by PP towards State Utilities for the monitoring period. All values are found correct. All the parameters are monitored and recorded as per the monitoring plan in the MR. The calculations/measurement of net electricity supplied to grid is under purview of state electricity board and the PP/Project activity Instance owner has no role on it. PP/Project activity Instance owner gets value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan The net electricity supplied the grid by the project activity during the monitoring period is 280,599.0 MWh. All relevant monitoring parameters have been verified with regard to the appropriateness of the applied measurement/determination method, the correctness of the values applied for ER calculation^{/7/}, the accuracy, and applied QA/QC measures. 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), tCO₂e $BE_y = 280,599.0 \text{ MWh} * 0.9475 \text{ tCO}_2\text{e/MWh}$ $= 265,866 \text{ tCO}_2\text{e (round down values)}$ As per applied methodology ACM0002 of version 19.0, the VCS PD, project emission is considered zero as the project activity involved wind power generation^{/4/}. PE_y (Project emission)= As per ACM0002 of version 19.0, all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected. As the project activity involved wind power project emissions (<i>PE_y</i>) are taken as zero. Leakage: As per ACM0002 of version 19.0, Leakage emissions are not considered for the project activity^{/19/}. Hence, $ER_y = BE_y - PE_y$ $= 265,866 - 0$ $= 265,866 \text{ tCO}_2\text{e (round down values)}$ Verification team confirms that the monitoring has been carried out in accordance with the monitoring plan contained in the approved VCS joint PD & MR^{/4/}. Assessment team confirmed that the GHG emission reductions and
--	---

	removals have been quantified correctly in line with the approved VCS joint PD & MR ^{4/} .
--	---

4.5 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 05 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 metering arrangement of energy meters (Main and Check) of accuracy class 0.2s at the “evacuation point” and at Government Substation”. These electricity meters are being used by state electricity board to prepare JMR/Share certificate statements. These meters record several parameters including electricity exported & imported. Also, Transmission loss is calculated on pro-rata basis as per the readings of “substation & “primary metering Point”. These electricity meters are being used by state electricity board for monthly generation reports. The details like make, Serial number, Calibration dates etc are as follow: - <table><tr><th colspan="2">Details</th><th>Main meter</th><th>Check meter</th></tr><tr><td colspan="2">Meter Number</td><td>18053689</td><td>18053925</td></tr><tr><td colspan="2">Make</td><td>L&T</td><td>L&T</td></tr><tr><td colspan="2">Accuracy</td><td>0.2s</td><td>0.2s</td></tr><tr><td colspan="2">Location</td><td>GSS</td><td>GSS</td></tr><tr><th>Meter</th><th>Calibration Date</th><th>Due date</th><th>Calibration agency</th></tr><tr><td rowspan="3">Main meter</td><td>13/06/2018</td><td>12/06/2023</td><td>HESCOM</td></tr><tr><td>15/12/2018</td><td>14/12/2023</td><td>HESCOM</td></tr><tr><td>17/06/2019</td><td>16/06/2024</td><td>HESCOM</td></tr><tr><td rowspan="3">Check meter</td><td>13/06/2018</td><td>12/06/2023</td><td>HESCOM</td></tr><tr><td>15/12/2018</td><td>14/12/2023</td><td>HESCOM</td></tr><tr><td>17/06/2019</td><td>16/06/2024</td><td>HESCOM</td></tr></table> Verification team confirms that all the energy meters (main and check meter) installed at the substation are of accuracy class of 0.2s and are calibrated as per the calibration frequency mentioned in monitoring plan in VCS joint PD & MR i.e. The calibration frequency of meters is once in 5 years. No delayed calibrations were observed in the project activity for this monitoring period. All the meters are of same accuracy class i.e., 0.2s as per the requirement of the approved joint PD & MR. During Onsite Inspection with O&M personnel also confirms the same. The calculation of net electricity supplied to grid is under purview of state electricity board and PP does not have control on it. Calibration details of the monitoring meters checked with calibration certificates submitted by PP and	Details		Main meter	Check meter	Meter Number		18053689	18053925	Make		L&T	L&T	Accuracy		0.2s	0.2s	Location		GSS	GSS	Meter	Calibration Date	Due date	Calibration agency	Main meter	13/06/2018	12/06/2023	HESCOM	15/12/2018	14/12/2023	HESCOM	17/06/2019	16/06/2024	HESCOM	Check meter	13/06/2018	12/06/2023	HESCOM	15/12/2018	14/12/2023	HESCOM	17/06/2019	16/06/2024	HESCOM
Details		Main meter	Check meter																																										
Meter Number		18053689	18053925																																										
Make		L&T	L&T																																										
Accuracy		0.2s	0.2s																																										
Location		GSS	GSS																																										
Meter	Calibration Date	Due date	Calibration agency																																										
Main meter	13/06/2018	12/06/2023	HESCOM																																										
	15/12/2018	14/12/2023	HESCOM																																										
	17/06/2019	16/06/2024	HESCOM																																										
Check meter	13/06/2018	12/06/2023	HESCOM																																										
	15/12/2018	14/12/2023	HESCOM																																										
	17/06/2019	16/06/2024	HESCOM																																										

	found that calibration frequency of 5 years is complied. Thus, no delayed calibration is observed and thus the same is found appropriate. The break down log is checked and there is no major breakdown during the monitoring period. No unforced error observed. No sampling procedure applied for monitoring of the data parameter and entire documents were checked by the assessment team to arrive at positive verification conclusions. The monitoring plan is followed at the project site. The monitoring meters were calibrated in line with the registered monitoring plan and there was no delay in calibration observed. Thus, assessment team concluded that the evidences are sufficient in quantity, and appropriate for the quality, to determine the GHG reductions and removals. Assessment team checked the calculation of estimated VER vs. Actual VER. As per the registered VCS PD the amount of VERs annually is 1,20,268 tCO₂e. The days involved in present monitoring period are 762. Therefore, on pro-rata basis, the estimated VERs for the monitoring period is 251080 tCO₂e. Actual VERs obtained for the monitoring period is 2,65,866 tCO₂e and thus the actual VER is 5.9% higher than the estimated VER. This variation is majorly due to high wind availability during the monitoring period which is a natural phenomenon and beyond the control of the Project Proponent and also the increase is within the sensitivity limit considered in the additionality as specified in the approved joint PD & MR. Hence, this change will not affect the additionality of the project. The VVB confirms that these doesn't have impact on additionality and the value is below the bench march. Hence confirms that increase in VER by 5.9% higher in this monitoring period is acceptable.
--	--

4.6 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 VERIFICATION CONCLUSION

Applus+ Certification has been engaged^{/02/} by Energon KN Wind Power Private Limited to perform the 3rd periodical verification of the “46 MW Mangoli Wind Power Project in Karnataka”.

The project participants are 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 approved VCS PD & MR^{/4/} and the applied methodology ACM0002 of version 19.0 ^{/19/}

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. Further, 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 document verifications. The entire documents checked/Power plant verification conducted to arrive at positive verification conclusions. 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 approved VCS PD & MR^{/4/};
- 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.
- A Reasonable Level of assurance was achieved as planned, during verification process.
- Verification period: 01-December -2019 to 31-December-2021 (inclusive of both days)

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

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
Year 2019	7,959	0	0	7,959
Year 2020	128,233	0	0	128,233
Year 2021	129,674	0	0	129,674

Total	265,866	0	0	265,866
-------	---------	---	---	---------

APPENDIX 1: DOCUMENTS REVIEWED OR REFERENCED (VERIFICATION)

No.	Author	Title	References to the document	Provider
1.	Respective State Utility	Commissioning certificates of all WTGs.		PP
2.	Applus	Contract of the project participant with the DOE. Ref. No. A+SH_SYST_TQC_VCS_VER_28021	27-October-2021	PP
3.	NA	The operational lifetime of the project activity from the manufacturer (Technical specifications)	Manufacturer technical specifications	PP
4.	NA	Approved joint PD & MR https://registry.terra.org/app/projectDetail/VCS/1771	28-December-2018	PP
5.	Respective state authority	Calibration Certificates of all energy meters	-	PP
6.	NA	MR version 01 MR version 02	10-March-2022 20-May-2022	PP
7.	NA	Emission reduction sheet version 01 Emission reduction sheet version 02	10-March-2022 20-May-2022	PP
8.	PP	O & M Agreements	-	PP
9.	NA	Tools/ guidelines used in the project activity - Glossary of CDM terms version 07 - VCS standard Version 4.2 - VCS Program Guide 4.1 - VCS verification report template version 4.1	UNFCCC CDM/VCS web site	UNFCCC
10.	State Utility for JMR, PP for invoice	Monthly statement- JMR & invoices for the complete monitoring period	-	PP
11.	PP	Declaration regarding no participation in other GHG program for the concerned monitoring period	20-April-2022	PP
12.	NA	Breakdown details for the monitoring period	-	PP
13.	NA	Grievance Register maintained at site	-	PP
14.	UNFCCC	CDM validation and verification standard for project activities, Version 03.0	-	UNFCCC
15.	Applus	Validation report. Report ID 4618- Internal report ID	Version: 02 10-January-2019	
16.	ESPL	Previous Verification Report, Report ID: VCS.VER.19.58	22-January-2020	PP

No.	Author	Title	References to the document	Provider
17.	PP	Breakdown details of the power plant	-	PP
18.	UNFCCC	ACM0002	version 19.0	UNFCCC

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

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

FAR ID	XX	Section no.	E.2	Date : DD/MM/YYYY
Description of FAR				
There is no FAR from the validation/previous verification of the project activity				
Project participant response				Date : DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

Table 2. CL from this verification

Project Implementation Status

CL ID	00	Section no.		Date: 25-April-2022
Description of CL				
NA				
Project participant response				Date: DD-Month-2022
NA.				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD-Month-2022
NA				

Table 3. CAR from this verification:

Project Implementation Status

CAR ID	01	Section no.	4.1	Date: 25-April-2022
Description of CAR				
During review of monitoring report following inconsistencies observed: 1. Duration of Monitoring Period mentioned in MR Version 1, Dated 10-March-2022 is not inline with contract signed with the DOE. Thus, corrective action sought. 2. Date format throughout the Monitoring report is not in line with the VCS Template Version 4.1, Thus, corrective action sought. 3. PP requested to submit copies of technical specifications of WTGs, O&M agreement, PPA & Breakdown sheet of the project activity. Kindly submit. 4. PP is requested to reframe the language of throughout the MR as the project activity is implemented and contributing towards sustainable development. Corrective action sought. 5. PP has mentioned commissioning date of project activity in section 1.1 of monitoring report, however to verify the same, supporting documents is missing. PP is requested to submit it to assessment team. Kindly submit.				
Project participant response				Date: 20-May-2022
1. We have requested amendment in the contract with revised monitoring period of 01-December-2019 to 31-December 2021. 2. Date format is corrected throughout the Monitoring report in line with the VCS Template Version 4.1, 3. Technical specifications of WTGs, O&M agreement, PPA & Breakdown sheet of the project activity are submitted now. 4. The language in the MR is modified as the project activity is implemented and contributing towards sustainable development. 5. Commissioning certificates are submitted to supporting document for the commissioning date. PP has mentioned commissioning date of project activity in section 1.1 of monitoring report.				
Documentation provided by project participant				
Revised MR Technical specification of WTG O&M Agreement PPA Breakdown log Commissioning certificates				
DOE assessment				Date: 04-June-2022
1. PP has submitted contract with revised monitoring period of 01-December-2019 to 31-December 2021 to the assessment team. Thus, CAR is Closed. 2. PP has corrected the date format throughout the Monitoring report in line with the VCS Template Version 4.1. Thus, CAR is closed. 3. PP has submitted the technical specifications of WTGs, O&M agreement, PPA & Breakdown sheet of the project activity to the assessment team the same is reviewed and is found correct and consistent. Thus, accepted. CAR is closed. 4. PP has reframed the language in the revised MR, version-2, Dated:20-May-2022, as the project activity is implemented and contributing towards sustainable development. Thus, CAR is Closed. 5. PP has submitted the commissioning certificate for the mentioned commissioning date of project activity in section 1.1 of monitoring report to the assessment team and is found correct and consistent. Thus, CAR is closed.				

CAR ID	02	Section no.	4.1	Date: 25-April-2022
Description of CAR				

PP is requested to submit an undertaking for no double accounting for current monitoring period and for project activity is participated in other GHG program other than VCS.	
Project participant response	Date: 20-May-2022
Undertaking letter confirming there is no double counting is now submitted.	
Documentation provided by project participant	
Undertaking letter	
DOE assessment	Date: 04-June-2022
PP has submitted the undertaking letter for no any double counting for current monitoring period dated 20-April-2022 and for project activity PP not claiming any ERs other than VCS verified by assessment team. Thus, CAR is closed.	

CAR ID	03	Section no.	4.2.2	Date: 25-April-2022
Description of CAR				
PP requested to submit records for ongoing local stakeholder consultation including grievance register etc. to assessment team.				
Project participant response				Date: 20-May-2022
<i>Grievance register is submitted</i>				
Documentation provided by project participant				
<i>Grievance register</i>				
DOE assessment				Date: 04-June-2022
PP has submitted Grievance Registers of the all units of the project activity. Assessment team found no major grievances has been made by local stakeholders during current monitoring period. Thus, CAR is closed.				

Accuracy of GHG Emission Reduction and Removal Calculation

CAR ID	04	Section no.	4.4	Date: 25-April-2022
Description of CAR				
1. In section 4.1 of the MR Version 1, Dated 10-March-2022, Weblink provided for source of Data is not functional. Thus, corrective action sought. 2. In section 4.2 of the MR Version-1.0, The unit of Data/ Parameter EG_{facility,y} is not consistent with the value mentioned in the approved joint PD & MR. Thus, corrective action sought.				
Project participant response				Date: 20-May-2022
1. In section 4.1 of the MR, weblink provided is updated. 2. In section 4.2 of the MR, The unit of Data/ Parameter EG_{facility,y} is now made consistent with the value mentioned in the registered PDD.				
Documentation provided by project participant				
<i>Revised MR</i>				
DOE assessment				Date: 04-June-2022
1. Weblink provided for source of Data in section 4.1 of the revised MR, Version-02 dated 20-May-2022 is now functional. Thus, CAR is Closed. 2. In section 4.2 of the revised MR, Version-02 dated 20-May-2022, the unit of Data/ Parameter EG_{facility,y} is now made consistent with the unit mentioned in the registered PDD. Thus, CAR is Closed.				

Quality of Evidence to Determine GHG Emission Reductions and Removals

CAR ID	05	Section no.	4.5	Date: 25-May-2022
Description of CAR				

In order to verify the calibration details mentioned in section 4.2 of MR Version 1, Dated 10-March-2022, PP is requested to submit the copies of calibration certificates covering complete monitoring period to the assessment team.

Project participant response **Date:** 20-May-2022

The calibration certificate for the complete monitoring period are submitted now

Documentation provided by project participant

Calibration certificates

DOE assessment **Date:** 04-June-2022

PP has provided Calibration certificates for main and check meters covering complete monitoring period to verify the calibration details mentioned in section 4.2 of the Revised Monitoring Report Version-02 dated 20-May-2022 to the verification team, and it is found correct and consistent with the MR. Thus accepted, CAR is 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	PANKAJ	KUMAR	TQC-Outsourced entity	Yes	No	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) / Technical Expert (TE)	EI	Shen	Simon	Applus+ Certification
2.	Approver	IR	Calle de Miguel	Agustin	Applus+ Certification

Short CVs of the Team:

- Mr. Pankaj Kumar** has done M. Sc in Environment Management from Forest Research Institute, Dehradun and B. Sc. (Hons.) in Environment & Water Management from Magadh University, Bihar, India. He has also done Post Graduate Diploma in Environmental Law from NLSIU, Bangalore. He

has more than 12 years of working experience in GHG Assessments and has participated during his career in Agencies and DOEs like MITCON, Agrinergy, Carbon Check and is empanelled with Applus+ Certification since 2015 for the performance of CDM/VCS/GS project assessments. He has extensive experience in the Renewable, Waste Management and Energy Demand Scopes of UNFCCC CDM and has done more than 100 Validations and Verifications of PAs and PoAs as Lead Auditor, Technical Expert and Technical Reviewer, mainly in Asia, Africa, USA, Asia Pacific and Americas under CDM, Verified Carbon Standard, Gold Standard & Social Carbon Standard, Brazil. He is an experienced, qualified and result oriented Environment and climate change professional having 16 yrs. of relevant experience in Climate Change (Mitigation & Adaptation), Environmental Due Diligence, Disaster Risk Reduction, Climate finance, adaptation planning, capacity building, validation and verification of GHG project. He can also provide technical support for environmental investigative, remedial projects involving air, water and soil, Waste management, EIA, Environmental Compliance, ISO 14001, OHSAS 18001, GHG accounting (ISO 14064) and Carbon foot printing. Mr. Pankaj Kumar is based in Patna, India. Mr. Pankaj Kumar may participate as part of the Audit Team as Lead Auditor and Technical Expert for the assessment.

2. **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. before he joined Applus+. Mr. Simon Shen has extensive experience also as former Applus+ Shanghai CDM Technical Manager. Mr. Simon Shen is based in Shanghai, China. Mr. Simon Shen participates in the project's technical review team.

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 ₂ e	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
PP	Project Participant