Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India

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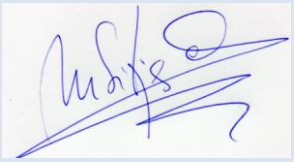
Approved By	Name Miquel Sitjes Cabanas, CDM Technical Manager and Technical Reviewer  Natalia Rodrigo Vega, CDM Project Activity Manager 
Work Carried Out By	Mr. Sukanta Das-Lead Auditor 

Summary:

Validation purpose: The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. Panama Wind Energy Godawari Private Limited is the promoters of the proposed project activity. The project activity involves installations of 2.0 MW x 40 WTG wind power project in the state of Maharashtra. The combined capacity of the project activity is 80 MW. The electricity generated from the WTGs will be sold to state electricity board. The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 136,936 tCO2e

per year, thereon displacing 140,160 MWh/year amount of electricity from the generation-mix of power plants connected to the NEWNE regional grid, which is mainly dominated by thermal/fossil fuel based power plant.

The project activity is the installation of an environmentally safe and sound technology since there are no GHG emissions associated with the electricity generation. The design lifetime of all the WTGs in the project activity is 25 years; this is accordance to the manufacturer's specification and state electricity regulatory norms.

The project is located at is in the state of Maharashtra, India. 80MW is installed which is checked by the assessment team during the validation site visit. The same is checked by the clearances received from state nodal agencies.

Verification purpose: The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. Panama Wind Energy Godawari Private Limited is the promoters of the proposed project activity. The project activity involves installations of 2.0 MW x 40 WTG wind power project in the state of Maharashtra. The combined capacity of the project activity is 80 MW. The electricity generated from the WTGs will be sold to state electricity board. The project achieved greenhouse gases (GHG's) estimated to be 187,744 tCO2e for the monitoring period, thereon displacing 192164.27 MWh/year amount of electricity from the generation-mix of power plants connected to the NEWNE regional grid, which is mainly dominated by thermal/fossil fuel based power plant.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center S.A. has been appointed by “Panama Wind Energy Godawari Private Limited” to perform the validation and verification of the “Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India” under VCS standard and guideline. The objective of this validation and verification activity is to have an independent third party for the assessment of the project design and Monitoring 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 v16”
- the project’s monitoring plan is assessed against “ACM0002 v16”
- the project’s additionality justification is assessed against “Tool for the demonstration and assessment of additionality”, Version 07.0.0
- 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 3.5
- CDM Validation and Verification Standard version 09
- CDM Project Standard version 09
- CDM Project Cycle Procedure version 09
- VCS standard v3.5
- VCS guideline v3.5

Validation and 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 validation and verification is the independent and objective review of the Project Document (PD) and Monitoring report (MR). The PD and MR are 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 validation and verification was based on the guidance given in the CDM Validation and Verification Standard version 09, CDM Project Standard version 09, CDM Project Cycle Procedure version 09 and VCS guideline and standard version 3.5

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 PD and MR. The main focus of the

assessment team is to identify the significant risks for the project implementation and the generation of VERs. The validation and 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 project design and monitoring report combined.

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

1.3 Level of Assurance

The verification and validation has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS.

1.4 Summary Description of the Project

The purpose of the project activity is to generate power using renewable energy source (wind) and sell the power generated to the state grid. The project activity generates electricity using wind potential and converts it into kinetic energy using Wind turbines, which drives the alternators to generate energy. The generated electricity is exported to the regional grid system which is under the purview of the NEWNE grid of India.

Validation purpose: The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. Panama Wind Energy Godawari Private Limited is the promoters of the proposed project activity. The project activity involves installations of 2.0 MW x 40 WTG wind power project in the state of Maharashtra. The combined capacity of the project activity is 80 MW. The electricity generated from the WTGs will be sold to state electricity board. The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 136,936 tCO2e per year, thereon displacing 140,160 MWh/year amount of electricity from the generation-mix of power plants connected to the NEWNE regional grid, which is mainly dominated by thermal/fossil fuel based power plant.

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2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

Validation and Verification Scope: The scope is defined as an independent and objective review of the project design document (PD) and Monitoring report (MR). The PD and 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 3.5, including the approved baseline and monitoring methodology ACM 002 version 16. The validation and verification was based on the requirements in the Validation and Verification Standard (VVS version 09), project standard version 09, project cycle procedure version 09 and VCS guideline and standard version 3.5

The validation and 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 project document and the Monitoring period.

Validation and Verification Process: The project assessment is based on the "Clean Development Mechanism Validation and Verification Standard version 09.0 and VCS standard and guideline version 3.5 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:

I A desk review of the project design documentation and Monitoring report;

II Follow-up interviews with project stakeholders;

III The resolution of outstanding issues and the issuance of the final validation report and opinion.

The prepared combined validation and 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+ LGAI 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.

The validation and verification checklist consists of three tables. The different columns in these tables are described in the tables below

Validation/Verification Checklist Table 1: Mandatory Requirements			
Requirement	Reference	Conclusion	Cross reference
The requirements which the projectmust meet.	Gives reference to the legislation or agreement where the requirement is found.	This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the validation report.	Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent validation process.

Validation/Verification Checklist Table 2: Requirement checklist				
Checklist Question	Reference	Comment	Draft Conclusion	Final Conclusion
The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organized in several different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	Gives reference to documents where the answer to the checklist question or item is found.	The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.	Conclusions are presentedbased on the assessment of the first PD and MR version.This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). Clarification is used when the validation team has identified a need for further clarification. Forward action request to highlight issues related to project implementation that requires review during the first verification.	Conclusions are presentedin the same manner basedon the assessment of the final PD and MR version andfurtherdocumentsincluding assumptions presented in the documentation.

Validation/VerificationChecklist Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	Ref. to checklist question in table 1&2	Summary of project owner response	Validation/Verification conclusion
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	Reference to the checklist question number in Table 1&2 where the Corrective Action Request or Clarification Request is explained.	The responses given by the Client or other project participants during the communications with the validation team should be summarized in this section.	This section should summarize the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".

Appointment of the assessment team

According to the sectoral scopes / technical area and experiences in the sectoral or national business environment, Applus+ LGAI has composed a project assessment team in accordance with the appointment rules in Applus+ LGAI. The composition of assessment team has to be approved by the Applus+ LGAI ensuring that the required skills are covered by the team. The four qualification levels for team members that are assigned by formal appointment rules as below:

- Leader Auditor (LA)
- Auditor (A)
- Auditor Trainee (T)
- Technical Experts (E)
- Internal Technical Review (ITR)

It is required that the sectoral scope / technical area related to the methodology has to be covered by the assessment team.Theassessment teamconsisted of the following individuals who were selected based on their validation and verification experience, as well as familiarity with renewable energy operations:

Sr. No	Auditor Name	Role
1	Mr. Sukanta Das	Team Leader
2	Mr. Sukanta Das	Technical expert (TA 1.2)
3	Mr.Miquel Sitjes Cabanas	Technical Reviewer
4	Ms. Natalia Rodrigo	Technical Reviewer in Training

BACKGROUND INFORMATION OF THE WORK TEAM (Audit team and Review Team):

Sukanta DAS, has done M. SC in Physicsand M. Tech in Energy technology fromTezpur Central University/ Indian Institute of technology Bombay in India. He is a certified lead auditor for ISO 14001EMS LA and ISO 9001 QMS LA from International registry for Certified Auditorsand Certified Lean Management practitioner from Quality Council of India. He has more than Sixyears of working experienceat TUV NoRD/ Re-consult under various categories of projects stating from Renewable to waste to supercritical projects. He was JI/CDM Lead Assessor in TUV NoRDandwas involved in more than 80 CDMvalidation and verifications activities and GoldStandard, VER projects as a team leader/technical reviewer¸validator / verifier covering the sectoral scope1 technical area 1.2/1.1. Currently he is associated with True Quality Certifications Private Limited and is empanelled with APPLUS certification to carry out GHG audit.

Miquel SITJES CABANAS (B. Sc. degree in Chemistry 1975, Universidad de Barcelona – Spain). He has 15 years of experience in a Spanish chemical group company specialized in the manufacturing of raw chemical products, where he worked as the Manager of Quality Control, Production Manager and Environmental Manager. He also worked in the Spanish pharmaceutical industry for 7 years as Quality, Manufacturing and Environmental Manager. He has been working in the Applus+ LGAI Technological Centre since 1999: he started working there as an auditor (quality, environment, CDM, VCS, greenhouse gas verification and others) and since 2006 he has been the Systems Certification Technical Manager.

Ms. Natalia Rodrigo Vega has a Bachelor's Degree on Environmental Engineering and Master´s Degree on Environmental and Quality Management System (under ISO 9001 and 14001). She Works in Applus Environmental and Quality Management Systems Department since March 2012, being specially involved on technical support tasks related to CDM-VCS and GS Standards, among others (i.e GHG verification and ProyectoClima)

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

Document review

The Project Document and Monitoring report submitted by the Client was reviewed against the approved methodology 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+ LGAI 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 validation and Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for Applus+ LGAI's positive conclusion on the project design and Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ LGAI were resolved during communications between the Client and Applus+ LGAI to guarantee the transparency of the validation process, the concerns raised and responses given are summarized below in the appendix 2.

The final combined PD and MR Version02 submitted by PP on 15/03/2016 serves as the basis for the final assessment presented. Additional changes to the project during the validation and 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 validation and verification of the final documentation including the combined validation and 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 validation/verification opinion and relevant documents are submitted to the EB through the UNFCCC web-platform

2.2 Document Review

The details of the document observed during the validation and 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.	Shintre	Ashok	Site In-charge, Panama Wind	12/03/2016	Implementation of the project, monitoring and emission reduction calculations	Mr. Sukanta Das
2	Natu	Rucha	EKI Energy Services Limited	12/03/2016	Baseline emission calculation, achieved emission reduction, monitoring process and discussion on host country criteria.	Mr. Sukanta Das
3	Deokar	Atul G	Villager	13/03/2016	Local stake holder meeting	Mr. Sukanta Das
4	Bonde	Sandeep D.	Farmer	13/03/2016	Local stake holder meeting	Mr. Sukanta Das

2.4 Site Inspections

Duration of on-site inspection:12-13/03/2016				
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.	Beed, Maharashtra	12/03/2016	Mr. Sukanta Das
2.	Assessment team meet with the local stakeholder and confirmed that there is no grievance resulted from the project activity in and out of the project location. The stakeholder confirmed that the project resulted in employment and improves lifestyles of the personal/families in the nearby villages.	Beed, Maharashtra	13/03/2016	Mr. Sukanta Das

2.5 Resolution of Findings

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

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Areas of validation and verification findings	No. of CL	No. of CAR	No. of FAR
Project design document and Monitoring report	00	01	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	01	00
- Establishment and description of baseline scenario	00	00	00
- Demonstration of additionality	00	01	00
- Emission reductions	00	01	00
- Monitoring plan	00	01	00
Others (please specify)-Matter related to Monitoring	00	01	00
Total	00	06	00

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

2.5.1 Forward Action Requests

No FAR was raised during this combined validation and verification process.

3 VALIDATION FINDINGS

3.1 Project Details

The proposed project activity involves the installation of Wind Power Projects. The total installed capacity of the project is 80 MW; which involves operation of 40 Wind Turbine Generators (WTGs) with capacity of 2 MW each located at Maharashtra state in India. The project is promoted by**Panama Wind Energy Godawari Private Limited**.

The Project activity is a new facility (Greenfield) and the electricity generated by the Project will be exported to the NEWNE electricity grid. The Project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. The Project Proponent plans to avail the VCS benefits for the Project.

In the Pre- project scenario the entire electricity, delivered to the grid by the project activity, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

Wind Power Project Technology Details –

The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation. There is no transfer of technology involved in the project activity.

The project activity comprises a total of 40 WTG's of Gamesa India Limited. The commissioning of the project activity has been completed and details are mentioned in section 1.5.

Technical details for Gamesa G97-2.0 MW[1], 2000 KW Machine

Particulars	Details
Model	Gamesa G97-2.0 MW
Rated power	2000kW
Diameter	97 m
Swept area	7,390 m²
Rotational speed	9.6 - 17.8 rpm
Design Lifetime	25 years

Power generated by the wind turbines will be collected at 33 kV and fed to pooling substation near Rajpimpri village (5 kms away), where it is stepped up to 132kV. The pooling station itself is then connected to 132 kV grid at MSETCL existing Substation Georai.

[1] http://www.gamesacorp.com/en/products-and-services/wind-turbines/gamesa-g97-20-mw-iiia-en.html

Means of validation	The guideline for completing VCS combined validation and verification template form version 03 for this project activity is checked by the assessment team
Findings	The PD and MR version 01 submitted to the DOE were not in compliance with the directive of the VCS combined validation and verification report version 02.
Conclusion	CAR 01 was closed based on revision in the PD and MR and in compliance with VCS form version 03 for this project activity. The PD and MR version 02 is thus acceptable to the assessment team.

3.2 Participation under Other GHG Programs

The project has not participated in any other GHG program. The Project has applied for the CDM under the Kyoto protocol which is under validation stage, however currently the PP is not willing to go ahead with CDM and existing contract of CDM validation is terminated.[2]

3.3 Application of Methodology

3.3.1 Title and Reference

Methodology: ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0, Sectoral Scope: 01, EB 81, Annex 9

https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

The project activity also takes reference from following Tools from the tools prescribed by applied methodology:

1. Tool for the demonstration and assessment of additionality --- Version 07.0.0, EB 70, Annex 8https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

2. Tool to calculate the emission factor for an electricity system --- Version 05.0, EB 87, Annex 09https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf.

3.3.2 Applicability

LGAI has assessed the relevant information contained in the PDD and evidence obtained during on-site visit against the application criteria listed in the methodology. The applicability of this methodology is justified as below:

- The proposed project activity is a greenfield, grid connected renewable electricity generation project,
- The project activity is the installation of wind power plant

[2]UNFCCC web link:

http://cdm.unfccc.int/Projects/Validation/DB/3EXK45ZD9TYCX75US5098OUPIT809D/view.html

- The project does not involve capacity addition, a retrofit of (an) existing plant(s) or a replacement of (an) existing plant(s)
- Project activity does not involve switching from fossil fuels to renewable energy sources at the site of project activity
- The project does not involve combined heat and power generation activity
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

Means of validation	The assessment team has validated the documentation referred to in the PD and verified the documentationcontent for verifying the justification of the applicability of the methodology and confirmed that the documentation referred to in the PD is correctly quoted and interpreted. The assessment team has also crosschecked the information provided in the PD with the documentation other than from the PD based on the local and sectoralknowledge of the assessment team. Following documentation has been reviewed by the assessment team: - Site visit - Interview with the concerned person mentioned in this report - Technical detail analysis of the power plant from the documents submitted by the manufacturer. - Commissioning certificates The assessment of the project's compliance with the applicability criteria of ACM002 version 16 are documented in detail in PD
Findings	Applicability criteria were explained properly as per the requirement of the applied approved methodology. No NC was raised during the validation process.
Conclusion	The applied baseline methodology is justified as it has been demonstrated that the proposed project activity is: • The proposed project activity is a greenfield, grid connected renewable electricity generation project, • The project activity is the installation of wind power plant • The project does not involve capacity addition, a retrofit of (an) existing plant(s) or a replacement of (an) existing plant(s) • Project activity does not involve switching from fossil fuels to renewable energy sources at the site of project activity

	• The project does not involve combined heat and power generation activity • The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available. Applus+ LGAI confirms that the application of the baseline methodology is transparent and conservative, and confirms that the chosen baseline and monitoring methodology i.e. ACM002 version 16is applicable to the project activity.

3.3.3 Project Boundary

Means of validation	The project boundary as depicted in the PD version 01 is checked during the validation site visit and also during the interview with the plant official.
Findings	CAR 02 is raised during the validation process and successfully closed after the revision in the PD version 02
Conclusion	The spatial extent of project boundary diagram (including the metering system) referred by the methodology is now mentioned in the PD as per the requirement of applied methodology and thus the same is acceptable to the assessment team. The below table mentions the emission source

	Sources	**GHGs involved**	**Description**
Baseline Emissions	NEWNE Grid	CO_2	Carbon Dioxide
Project Emissions	NA	NA	NA

3.3.4 Baseline Scenario

Means of validation	The baseline scenario as depicted in the PD version 01 is checked during the validation site visit and also during the interview with the plant official.
Findings	No findings were raised.
Conclusion	Being a grid connected wind energy generation project, PP developed the project based on the Methodology ACM002 version 16. As per Para 23 the methodology *""Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an*

	electricity system" As per VVS version 09, "*where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the PD selected to determine the most realistic baseline scenario."* Thus, PD should mention the credible alternatives to the project activity in order to determine the most realistic baseline scenario. As the selected approved methodology clearly mention the baseline scenario and the same has been opted in this project, therefore, no further analysis on baseline is required. Validation Team, therefore, concludes that the PD conforms to the guidance given by EB via VVS version 09

3.3.5 *Additionality*

Means of validation	The cost of windmills, electricity tariff, O&M cost, depreciation, salvage value and tax rate have been checked with offer letters, purchase order, tariff order, Income Tax Act 1961, Power purchase agreement, third party PLF report and financial analysis sheet. During the validation site visit validation team interviewed the personal and confirms that the input parameters considered is appropriate and correct.
Findings	Assessment team raised concern regarding the additionality and supporting document. The detail of the same is mentioned as CAR 03 in this report and the same is closed successfully
Conclusion	During conceptualization of the project activity, board of directors of the project proponents considered the GHG revenue to improve the project financials. During the board meeting dated 12/12/2012, board of Directors decided that they would consider GHG revenue for their project activity. In continuation to the board decision, PP received offer letter and then after subsequent decision with the manufacturer placed the purchase order for procuring of the wind turbine. *In the above background Validation Team concludes that the additionality justification regarding the serious CDM/VCS consideration given by the project developer is in accordance with the requirements derived from VVS version 09.* PD mentioned that the project would not be economically or financially feasible without the revenue from the sale of verified emission reductions (VERs). The claim of the project developer has been assessed by the Validation Team through the following steps*:* <u>a) Suitability of investment analysis, financial indicator and benchmark:</u> Project developer had demonstrated that the financial returns of the proposed VCS project activity would be insufficient to justify the required capital investment as per VVS version 09. In the PD version 01, PP has adopted a conservative approach to identify the benchmark for the project activity. The project is earning revenue from the installation of the project activity. Thus simple cost analysis is not appropriate. Also in the absence of the project activity grid electricity would have been the obvious choice for the Project which requires no investment.

Hence investment analysis is also not appropriate for the project activity. Therefore, benchmark analysis is used for the project activity as per project type and decision making context. As per Para 12 of the Guidance to Investment Analysis states that required returns on equity is appropriate benchmark for Equity IRR. Therefore, the Expected return on equity is considered appropriate benchmark.Accordingly, the post tax Equity IRR has been considered as the relevant financial indicator for the project activity.

PP at first identified the benchmark using the guideline vide EB 62 Annex 05, "The values in the table in Appendix A may also be used, as a simple default option". However, since RBI (Reserve Bank of India, India Central Bank) provides forecast inflation for both 5 & 10 years, the project investor has calculated benchmark using both the durations and the most conservative value is considered as benchmark for the project activity. The WPI median inflation forecast for 5 years and 10 years are added to the default values for the project participant as per the requirement of EB 62 Annex 05

The benchmark for the project is as follows:

WTG Owner	**WPI Inflation Forecast (Median)**[3]		**Benchmark**	
	5 Years	**10 Years**	**5 Years**	**10 Years**
Panama Wind Energy Godawari Private Limited	6.50%	6.00%	19.01%	18.46%

The lower of the 2 values determined is considered as benchmark and thus the same is deemed appropriate.

b)Parameters and assumptions used:

The project activity is a renewable source of electricity generation and supplies the electricity to the NEWNE grid.The total installed capacity of the project activity is 80 MW equipped with 40 WTGs with rated capacity of 2. MW in the state of Maharashtra. The key parameters which determine the Equity IRR of the project activity are project cost, PLF and profitability estimates.

In the PD version 01, the project cost is based on the offer letter submitted by WTGs supplier. Copies of all offer lettershave been submitted to validation team. The total cost of the 80MW WTGs is 4600 Mn and thus Per MW cost thus comes as 57.5 Mn/MW. The offer letters were available during decision making and financial profitability of the project was decided based on this offer letter. Validation team checked all the offer letters of the project activity and found

[3] https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/01SPFMD291012.pdf

	that consideration of the project cost in PD is correct and it is in line with Para 6 of Annex 05, EB 62 as well as in compliance to VVS version 09. Hence, the project cost consideration is justified. Further, signed purchase ordershave been checked by the assessment team as the actual cost is available during the validation. The IRR calculated with offer is even higher than the purchase order and it does not breach the benchmark. The variation in purchase and offer is taken care in sensitivity analysis and the approach is considered correct by the assessment team. In India, infrastructure projects are generally entitled to a debt equity ratio of 70:30. However, depending on the relationship of the client with the bank, its credit rating and collaterals offered, banks consider higher debt equity ratio also. However, for the present project the total project cost is based on equity investment and thus no debt incurred by the project. The profitability of the project, which forms the basis for IRR calculation is based on installed capacity, PLF, electricity tariff, O&M cost, depreciation and taxation. The installed capacity is based on the capacity of wind mills, which is evidenced by the Offer letterand purchase ordersissued subsequently. c)Assessment of Plant Load Factor (PLF): PP considered the Plant load factor from a third party engineering company, for expected electricity generation estimation. They are contracted by the PPs for this project. PP has submitted the copies of the PLFs estimation report to the assessment team. The PLF considered for the project activity is 20% as per the MERC report/order. PLF is considered as per MERC report and the same is acceptable to the assessment team. d)Assessment of Electricity Tariff and Wheeling Charge: The tariff is based MERC tariff policy. http://www.mercindia.org.in/pdf/Order%2058%2042/MERC_RE%20Tariff%20Order%20(Suo Motu)_for%20FY2012- Validation team assessed the tariff order and found that same value was available during decision making and in conformity with guidance 6 of Annex 05, EB 62. Furthermore, assessment team has also checked the actual tariff in the power purchase agreementsigned for further substantiation as these values are available during the validation stage. The consideration of tariff rate mentioned in the power purchase agreement also does not breach the benchmark and hence the project is still additional. e)Assessment of O& M cost: During submission of PD version 01, PP considered the O&M cost from the offer letter submitted by WTGs supplier. The offer value has been used in the financial calculation as same was available during decision making and hence applicable. According to guidance 6 of

	Annex 05, EB 62, the cost should be based on the input parameters available at the time of decision making and the PP have submitted offer letterssupporting this consideration. Therefore, considering the above assessment, validation team concluded that the O&M cost considered from respective offer letter in the computation of financial indicator is in conformity with guidance 6 of Annex 05, EB 62. f)Assessment of Tax computation: The project developer has adopted book depreciation rates as per Schedule XIV of the Companies Act, 1956 for computing book profit and Income Tax Act 1961 stipulated for income tax calculation, which are in conformity with the accepted accounting principles adopted by the company and income tax laws in the host country. The block of assets has been computed for depreciation purpose as per the accepted accounting principles. Tax liability has been calculated as per the income tax rules and the rulings given. In computing the income tax liability, the project developers have considered Tax holiday (u/s 80IA of the Income Tax Act, 1961). Accelerated depreciation on plant and machinery is also sourced from IT act. The tax rates assumed corresponds to the tax rate prevailing at the time of taking decision (conformity to guidance 6 of Annex 05, EB 62). Hence, these assumptions are appropriate during decision making context. g)Cross checking parameters: The cost of windmills, electricity tariff, O&M cost, depreciation, salvage value and tax rate have been checked with offer letters, tariff order, Income Tax Act, power purchase agreement. The offer value has been used in the financial calculation as same was available during decision making and hence applicable. According to guidance 6 of Annex 05, EB 62, theO&M cost should be based on the input parameters available at the time of decision making and the PP have submitted offer letterssupporting this consideration. There is no difference in the value used for O&M in the IRR sheet and the offer letter. The same is acceptable to the assessment team The project developer has adopted book depreciation rates as per Schedule XIV of the Companies Act, 1956 for computing book profit and Income Tax Act 1961 stipulated for income tax calculation, which are in conformity with the accepted accounting principles adopted by the company and income tax laws in the host country. The tariff is based MERC tariff policy. http://www.mercindia.org.in/pdf/Order%2058%2042/MERC_RE%20Tariff%20Order%20(Suo Motu)_for%20FY2012- There is no difference in the value used for tariff in the IRR sheet and the MERC order. The documents supporting the financial calculations, in the opinion of Validation Team, are therefore authentic and conform to the guidance given by EB. CARs and CLs were raised as non-conformities and they were either set right or clarified. With the corrections having been incorporated, the input costs considered conform to guidance on investment analysis issued by EB. All the input parameters considered in computation, the basis, correctness and appropriateness thereof are checked and found correct.

h)Assessment of correctness of computation:

The assessment involved checking the data input taken from offer letter, power wheeling agreement, tariff order, adoption of correct accounting principle and arithmetical accuracy. Validation Team checked the documents and ensured that appropriate input has been taken in the project cost and projections. Based on the CARs and CLs, corrections were incorporated or issues were clarified. The arithmetical accuracy was also found to be correct.

The equity IRR has been computed for a period of 25 years, which is the life time of the project and is in conformity with the Annex 05 of EB 62. As required by Annex 05 of EB 62 the expected realization on the sale of assets at the end of the operating life has been taken as salvage value in the terminal year. In computing the IRR, the project developer has taken into account profit after tax, depreciation tax shield and salvage value (in the terminal year). The principle adopted conforms to the accepted accounting and taxation principles.

Validation team also confirms that rest of the input parameters are considered appropriately and are in line with guidance 6 of Annex 05, EB 62.Therefore, from the above arguments/ justifications it is evident that the project is not business as usual scenario and requires CDM benefits to sustain.

Sensitivity analysis:

The Guidance on Assessment of Investment Analysis Version 05.0 (EB 62) requires the robustness of the conclusion arrived at to be proved through a sensitivity analysis by varying the critical assumptions to a reasonable variation. The project developer has identified Plant Load Factor (PLF), Project cost, Electricity tariff and O&M cost as critical assumptions. These critical parameters constitute more than 20% of either total project costs or total project revenues. The sensitivity analysis reveals that even under more favorable conditions, the IRR without CDM revenue would not cross the benchmark return as given in the following table:

Variation %	**-10%**	**Normal**	**10%**	**Breaching Value**
PLF	9.97%	13.12%	16.47%	15.70%
O&M Cost	13.64%	13.12%	12.59%	-106.99%
Project Cost	16.33%	13.12%	10.71%	-15.25%
Tariff Rate	10.15%	13.12%	16.28%	16.59%

- The PLF is considered from the third party engineering company for the long duration data. The probability of the PLF going higher than 10% is highly unrealistic and thus the PLF considered under the project activity is assessed to be appropriate.

- The actual purchase orders were available to the assessment team at this stage of

validation. The project cost variation with the offer is well within 10% variation. The increase of project cost is highly unlikely scenario.

- The O&M cost is considered from the offer letters. With the country experiencing 5% inflation on an average, the question of O&M coming down is ruled out The purchase orders for all the project proponents provides for a 5% escalation in the cost every year. The sensitivity of 10% variation also does not cross the benchmark.

- The actual power purchase agreement is signed for 24MW and available to the PP at this stage of validation for 13 Years. The wheeling agreement of rest MW will be signed when the projects get commissioned. However, the increase or decrease of tariff charges is highly unlikely.

The results of sensitivity analysis show that even with a variation of +10% & -10% in Project Cost, O&M cost, PLF and Tariff Rate Equity IRR is significantly lower than the benchmark. And it is evident from the results given above; the project remains additional even under the most favourable conditions.

Considering the above assessment on additionality demonstration, benchmark selection, appropriateness of parameters used and correctness of financial calculations, Validation Team concludes that the project scenario is not economically feasible without benefits from CER sales. Hence, validation team confirms that CER revenues alleviate the project feasibility

Common practice analysis is checked with the following steps:

Step (1):*Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.*

Range	**Capacity**	**Unit**
+50%	120.00	MW
Capacity of the proposed project activity	80.00	MW
-50%	40.00	MW

Step (2): *identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:*

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

	(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity; *(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;* *(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;* *(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.* Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows: (a) Project is located at Maharashtra, India. Therefore, country has been chosen for analysis. (b) The project activity is a green-field wind power project and uses measure (b) *"Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies"*. Therefore, all projects applying same measure (b) as the proposed project activity are candidates for similar projects. (c) The energy source used by the project activity is wind. Hence, only wind energy projects have been considered for analysis. (d) The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects. (e) The capacity range of the projects is within the applicable capacity range from 40.00 MW to 120.00 MW. (f) The start date of the project activity is 31/03/2014. As Kyoto Protocol was ratified by India on 26/08/2002[4], therefore projects, which had started commercial operation between 26/08/2002 to 31/03/2014, have been identified. Numbers of Similar projects (CDM and non-CDM) identified, which fulfil above-mentioned conditioned are:

[4] http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php

Particulars	No. of Projects	Source
N_{Wind}	29	Directory - Indian Wind Power published by CECL, Bhopal - 2013

Sources: Directory - Indian Wind Power published by CECL, Bhopal and refer CPA sheet

Step (3):*Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number* N_{all}.

All the projects identified in step-2 are either registered or project activities submitted for registration, or project activities undergoing validation.

Thus N_{all} = 23

Step (4):*Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number* N_{diff}.

From the projects identified above, those projects which employ "**different technologies**" have been excluded and the number of such projects has been identified as N_{diff}.

The policies/tariff for each state is regulated by the State Electricity Regulatory Commission of the respective states. The project activity is located in the state of Maharashtra of India and the policy applicable for the wind projects is regulated by Maharashtra Electricity Regulatory Commission. Therefore, it can be assumed that the policies and tariff are different in different states and hence projects installed in other states have been considered in Ndiff. The identified projects in Nall (step 3) located in states other than Maharashtra is regulated by the respective State Electricity Regulatory Commissions (SERCs). Therefore, these projects come under different investment climate and have been considered under Ndiff.

As N_{all} = 23; thus N_{diff} = 21

Step (5):*Calculate factor* $F=1-N_{diff}/N_{all}$ *representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.*

Calculate $F=1-N_{diff}/N_{all} = 0.0870$

As N_{all} =23 thus and $N_{all}-N_{diff}$= 2;

Outcome of Step 5:

	As, i. F = 0.0870 which is less than 0.2; ii. N_{all}-N_{diff}= 2 which is less than 3 Thus, the proposed project activity is not a "common practice" within a sector in the applicable geographical area.

3.3.6 *Quantification of GHG Emission Reductions and Removals*

Means of validation	The emission reduction sheet, CEA database and PD version 02 is checked by the assessment team.
Findings	No NC raised during the validation process.
Conclusion	The baseline emissions as discussed in PD will include emissions that would have occurred in the absence of the project activity. The emission reduction calculation has been done as per the methodology ACM002 version 16. **<u>Baseline Emission (BEy):</u>** $BEy = EG_{PJ,y} x EF_{grid,y}$----------(1) Where BE_y = Baseline Emissions in year y; (tCO_2) $EG_{pj,y}$= Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh) $EF_{grid, y}$ = Grid emission factor (MWh/tCO_2) PP has estimated the baseline energy generation considering the capacity of the project activity, yearly generation hour and plant load factor. The project activity involves installation of 80 MW grid connected power plant in the state of Maharashtra.Validation team assessed the technical specification of the promoters of the project activity, Further, PP considered the PLF of the project activity from MERC order. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors according to the procedure prescribed in the "Tool to calculate the emission factor for an electricity system" version 10.0 which is sourced from CEA, Govt. of India and forms the part of emission reduction calculation. The baseline emission factor calculation is checked by the validation team and found that the calculation is transparent and conservative. For estimating the operating margin emission factor, PP calculated ex-ante Simple Operating Margin (OM). As per the "Tool to calculate the emission factor for an electricity system": for grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. Hence, PP considered the weighted average of latest net electricity generation and import of electricity and associated emission from CEA. The value of operating margin considered as 0.9862tCO_2 /MWh and the value of build margin as 0.9495tCO_2 /MWh (based on

	the latest one year data). The weighting for both operating margin is taken as 0.75 and build margin as 0.25 for wind power generation projects. Validation team checked the estimation procedure and considered data and found transparent and conservative. Emission factor of the project considered is mentioned below: $EF_{grid, y =}$ 0.9770 tCO_2e/MWh and it is fixed ex ante for the crediting period. Considering this process, combined margin emission factor has been considered and same value is confirmed correct. **Project Emissions:** As Wind technology is a renewable energy source and as per the ACM002 version 16 there are no project related emissions associated with it, therefore, $PE_y = 0$. **Leakage Emissions:** As per the ACM 002 version 16, if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered. No equipment transfer of any type is taking place as all equipment is procured newly.Hence the leakage is considered as zero, $LE_y = 0$ **Emission Reductions:** The project activity reduces carbon dioxide emissions through displacement of grid electricity generation with predominantly fossil fuel based power plants[5] by renewable electricity. The emission reduction (ER_y) due to project activity during a given year y is calculated as the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (LE_y), as per the formulae given below: $ER_y = BE_y – PE_y - LE_y$ Where, BE_y = Baseline emissions in the year y in tCO_{2e} PE_y = Project emissions in the year y. LE_y = Emissions due to leakage in the year y. Here, PE_y = 0 for the project activity as per the methodology. LE_y = 0 for the project activity. Therefore, $ER_y = BE_y$.

[5] http://www.cea.nic.in/power_sec_reports/general_review/0304/tables.pdf

3.3.7 Methodology Deviations

No methodology deviation is sought for the project activity.

3.3.8 Monitoring Plan

Means of validation	Assessment team checked the monitoring practice onsite and also checked the guideline of MERC
Findings	Assessment team raised concern regarding the Monitoring and supporting document. The detail of the same is mentioned as CAR 04 in this report and the same is closed successfully
Conclusion	**Parameters determined ex-ante:** Baseline emission factor of NEWNE Grid is establish ex-ante based on Tool to calculate the grid emission factor, using a combined approach consisting 75 % operating margin and 25 % build margin. The emission coefficient from official data published in Central Electricity Authority (CEA) CO_2 Baseline database available to the project participant at the time of submission of PDD for validation and global stakeholder's consultation process. CEA is an official source of Ministry of Power, Government of India have worked out baseline as CO_2 baseline database. The assumption were verified by the validation team and found to be correct. **Parameters determined ex-post:** The parameters monitored ex-post involves net electricity supplied to the grid (calculated from electricity exported and imported) to the NEWNE grid by the project activity. The WTG under this project activity is connected to common feeder where other WTG (not under this project activity) are also connected; hence an apportioning method has been used for the calculation of net electricity exported through individual project proponent. As per the PD (version 02), the share certificates provided by MSEDCL are the source of the monthly values of net electricity supplied by the project activity. The DOE will use the same source for verification of emission reductions. MSEDCL is a Government Organization responsible for distribution of electricity, with no interests in the Project Activity. As per the applied methodology ACM002 Version 16 "Monitoring shall consist of metering the net electricity supplied by the project activity to the grid. Measurement results shall be cross-checked with records for sold electricity/electricity bills". In accordance with the methodology requirement, net electricity supplied by the project activity is obtained from the JMR statement provided by MSEDCL and form the forms the basis for emission reduction calculation. Electricity export to the grid and import from the grid is metered by main and check tri-vector energy meters. The main meter reading is taken jointly on a fixed day of every month for the preceding month at the delivery point and signed by the representatives of state utility and O&M personnel. In the event of failure of main meter, the check meter will be used in monitoring the electricity data. The

	WTG is equipped with an integrated electronic meter. This meter is connected to the Central Monitoring Station (CMS) of the O&M service provider of the entire wind farm. The generation data of WTG can be monitored as a real-time entity at CMS by the O&M contractor. The agency is experienced in the monitoring system and is managing O&M of numerous other wind farm projects. The validation team therefore is of the opinion that the project participant through the O&M agency is capable of implementing the monitoring plan in the context of the project activity. Calibration of all the meters is done by state electricity board officials as per the industry standards. However, the calibration will be done once in a 5year[6]. The energy meter recording the export and import from the grid at substation is under the control and supervision of state electricity board officials. Similarly O&M contractor is responsible for monitoring of the generation data at CMS. It is reported that the data will be kept for 2 years following the end of the crediting period. The responsibilities and authorities of project management, data handling and recording, measurement methods and QA/QC procedurehave been systematically established and formalized and the same was verified during the site visit.

3.4 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	
1.	No risk	Nil	Not applicable	Complete verification of all the values indicated in the emission reduction spreadsheet in documents such as JMR/Invoices. No sampling approach adopted and complete site validation and verification is performed.

[6] http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf, page 12

3.5 Environmental Impact

Means of validation	The guideline provided by MOEF is checked by the assessment team http://envfor.nic.in/legis/eia/so1533.pdf
Findings	NA
Conclusion	The project activity is expected to have positive impacts and no significant adverse environmental impacts are foreseen. Since, the project activity is an electricity generation from renewable source (i.e. wind energy) therefore no negative impact are envisaged. There is no mandatory legal requirement for carrying out an environmental impact assessment in the host country. The Ministry of Environment and Forests (MoEF), Government of India (GoI) notification [7] dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. The list includes thirty nine project activities that require EIA studies. The wind power projects are not included in this list and thus an EIA study is not required.

3.6 Stakeholder Comments

Means of validation	The local stakeholder consultation MOM, attendance sheet is checked by the assessment team. During the validation site visit assessment team also interviewed some of the stakeholder present during the meeting with PP.
Findings	No NC is raised during the validation process.
Conclusion	As per the CDM/VCS requirements, it is necessary to invite the relevant stakeholders, before the validation process starts. All the stakeholders have been invited through submission of the invitation letter (delivered in hand) to attend the stakeholders meeting. The local stakeholders' consultation meeting was attended by local persons including local villagers, local vendors and technology suppliers. The stakeholders identified by the project participant were local villagers who are the major population of the particular area, local communities and gram panchayat (Village head), WTG supplier, project proponent representatives, O&M Team and other people involved in the project. Validation team verified the list of participants who attended the stakeholder meeting and feedback questionnaire and confirms the stakeholders identified are relevant. The validation team also verified the minutes of meeting to note that no negative comments were received and the same was cross checked with the information obtained during follow up interviews with the stakeholder's. Thus Validation team is of the opinion that the stakeholder meeting was adequate and appropriate.

[7] http://envfor.nic.in/legis/eia/so1533.pdf

4 VERIFICATION FINDINGS

4.1 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 05 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 baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. The regional grid in this case would be the 'Northern Grid' **Formula Used:-** $BE_y = EB \times EF_{NEWNE}$ Where BE_y= Baseline emission for year 'y' EB = Energy Baseline; and EF_{NEWNE} = Emission factor for Northern Grid The verification team has checked the entire monthly JMR report and energy bill applicable for the monitoring period and found all the parameters are monitored and recorded as per the revised monitoring plan in the registered PDD. The verification team has crosschecked the emission reduction sheet and monitoring report data with the JMR sheet and energy bills and found all the values are matching.

4.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

Means of verification	The verification team checked the break down log for the monitoring period. During the verification site visit the feeder wise location of the WTGs is also checked. The Calibration details are also checked.
Findings	CAR 6 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 tri-vector 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 MSEDCL for JMR (Joint Meter Reading) electricity generation statements. 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 registered PDD. On-site visit and interview with O&M personnel also conforms the same. The break down log is checked and found that the WTG undergone scheduled maintenance and break down. No unforced error observed and feeder wise WTGS location is also checked and found correct.

5 VALIDATION AND VERIFICATION CONCLUSION

Validation Conclusion:

Applus+ LGAI has performed a validation of the "Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India". The validation was performed on the basis of UNFCCC/VCS criteria and host country criteria, as well as criteria, e.g. ACM002 version 16, given to provide for consistent project operations, monitoring and reporting.

The review of the project documentation and the subsequent follow-up interviews has provided Applus+ LGAI with sufficient evidence to determine the fulfillment of stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria. The project will hence be recommended by Applus+ LGAI for registration with the UNFCCC.

By displacing fossil fuel-based electricity with electricity generated from a renewable source, the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. An analysis of the investment and technological barriers demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of annual emission reductions of 136,936tCO_{2e}.

The validation has been performed following the requirements of the latest version of the CDM VVS version 09, VCS standard and guideline version 3.5 and on the basis of the contractual agreement. The single purpose of this report is its use during the registration process as part of the VCS project cycle.

Verification Conclusion:

Applus+ LGAI has been engaged by Panama Wind Energy Godawari Private Limited to perform the 1st periodical verificationof the "Wind Based Power Generation by Panama Wind Energy Godawari Private Limited, Pune in the State of Maharashtra, India

The management of Panama Wind Energy Godawari Private Limitedis 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 VCS PD and the applied methodology ACM002 version 16.

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 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 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: 31-March-2014 to 01-March-2016

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)
2014	34,597	0	0	34,597
2015	141,720	0	0	141,720
2016	11,427	0	0	11,427
Total	187,744	0	0	187,744

APPENDIX 1:

Documents reviewed or referenced (Validation+Verificaton)

No.	Author	Title	References to the document		Provider
1	NA	Commissioning certificates of the WTGs implemented	**Machine ID**	**DOC**[8]	Project participant
			G 1	7-Oct-14	
			G 2	7-Oct-14	
			G 3	7-Oct-14	
			G 4	7-Oct-14	
			G 5	6-Sep-14	
			G 6	7-Oct-14	
			G 7	7-Oct-14	
			G 8	7-Oct-14	
			G 9	7-Oct-14	
			G 10	7-Oct-14	
			G 11	7-Oct-14	
			G 12	7-Oct-14	
			G 13	7-Oct-14	
			G 14	6-Sep-14	
			G 15	6-Sep-14	
			G 16	7-Oct-14	

[8]Date Of commissioning

				G 17	6-Sep-14	
				G 18	7-Oct-14	
				G 19	7-Oct-14	
				G 20	7-Oct-14	
				G 21	5-Dec-14	
				G 22	6-Sep-14	
				G 23	6-Sep-14	
				G 24	31-Mar-14	
				G 25	31-Mar-14	
				G 26	25-Jul-14	
				G 27	25-Jul-14	
				G28	25-Jul-14	
				G 29	31-Mar-14	
				G 30	31-Mar-14	
				G 31	31-Mar-14	
				G 32	25-Jul-14	
				G 33	31-Mar-14	
				G 34	31-Mar-14	
				G 35	31-Mar-14	
				G 36	31-Mar-14	
				G 37	31-Mar-14	
				G 38	25-Jul-14	
				G 39	31-Mar-14	
				G 40	31-Mar-14	

2	NA	Contract of the project participant with the DOE	Contract document signed between PP and DOE	Project participant
3	NA	PLF assessment study report for the project activity	PLF report by GARRAD HASSAN dated 10 June 2014	Project participant
4	NA	Technical specifications of wind turbine generators from manufacturers	Manufacturer technical specifications	Project participant
5	NA	Board decision for serious CDM consideration	Board Note dated 12/12/2012	Project participant
6	NA	Power Purchase agreement for the project activity (24MW)	PPA dated 01/08/2014	Project participant
7	NA	PD version 01 PD version 02	25-Jan -2016 15-March-2016	Project participant
8	NA	Financial Calculation sheet- version 01 Financial Calculation sheet- version 02	25-Jan -2016 15-March-2016	Project participant
9	NA	Emission Calculation sheet- version 01	15-March-2016	Project participant
10	NA	Offer letter for the project activity	Offer letter submitted dated 03/12/2012	Project participant
11	NA	The operational lifetime of the project activity from the manufacturer=(Technical specefications)	Manufacturer technical specifications	Project participant
12	NA	The stakeholder consultation process documents: 1. List of attendee 2. Minutes of meeting	MOM and attendance sheet of the meeting	Project participant

		Feedbacks from the stakeholders		
	NA	CA certificate to confirm Loan sanction for the project activity	CA certificate	Project participant
13	NA	MERC orders: http://www.mercindia.org.in/ 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
14	NA	Tools/ guidelines used in the project activity • Clarification on national and/or sectoral policies Para 27 EB 55 • Guidelines for the reporting and validation of Plant Load Factor Annex 11 EB 48 • Guidelines on the demonstration and assessment of Prior Consideration of the CDM EB 62 Annex 13 • Guideline for the demonstration of	UNFCCC CDM web site	UNFCCC

		investment analysis Annex 05 EB62 • Tool to determine the remaining lifetime of the project activity in line with Annex 15 EB 50 • Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, Version 2, EB 41 • Tool to calculate the emission factor for an electricity system version 03 • Glossary of CDM terms version 07 • VCS combined validation and verification report template version 03		
15	NA	JMR records for the complete monitoring period	JMR records	PP
16	NA	MR version 01 MR version 02	25-Jan 2016 15-03-2016	PP
17	NA	Invoices for the complete monitoring period	Invoice	PP
18	NA	Break down details of the complete monitoring period	Log sheet	PP

APPENDIX 2:

Clarification requests, corrective action requests and forward action request:

Type:	☒ **CAR** ☐ **CL** ☐ **FAR**	**Number:**	01
Raised by:	SUKANTA DAS	**Ref. to checklist in table 1&2:**	**Section**
Description of the audit finding		**Date:**	14/03/2016
The report template used for MR and PD is not the latest template prescribed by VCS. Corrective action is sought.			
Project Participant'sresponse		**Date:**	15/03/2016
Report template used for the MR and PD is now updated as per latest prescribed formats by the VCS board.			
Documentation provided as evidence by Project Participant			
VCS Joint PD & MR dated 15/03/2016			
Auditor's assessment comment		**Date:**	17/03/2016
VCS joint PD and MR is checked by the assessment team.			
Conclusion by Lead Auditor		**Date:**	17/03/2016
All the section of VCS PD+MR is written properly and as per the requirement of VCS joint PD and MR template. CAR is thus closed.			

Type:	☒ **CAR** ☐ **CL** ☐ **FAR**	**Number:**	02
Raised by:	SUKANTA DAS	**Ref. to checklist in table 1&2:**	**Section**
Description of the audit finding		**Date:**	14/03/2016
The Metering diagram is missing in the flow chart related to project boundary. PP is			

requested to include the same. Corrective action is sought regarding the same.		
Project Participant'sresponse	**Date:**	15/03/2016
Metering diagram is now a part of project boundary. DOE is to request to refer the revised joint PD and MR template supporting the flow chart.		
Documentation provided as evidence by Project Participant		
VCS Joint PD & MR dated 15/03/2016		
Auditor's assessment comment	**Date:**	17/03/2016
VCS joint PD and MR is checked by the assessment team.		
Conclusion by Lead Auditor	**Date:**	17/03/2016
The metering diagram are now included in the revised VCS (PD+MR) version 02 dated 15/03/2016. The same is checked and found correct by the assessment team. CAR is thus closed.		

Type:	☒ **CAR** ☐ **CL** ☐ **FAR**	**Number:**	03
Raised by:	SUKANTA DAS	**Ref. to checklist in table 1&2:**	**Section**
Description of the audit finding		**Date:**	14/03/2016

PD version 01 is assessed and following observations are made:

1. The operational lifetime is considered as 25 years while the IRR is computed till 20 Years. Please clarify
2. De-ration of 10% is considered for the project sitting the TERI report. However no link is provided to assess the same. Please also mention whether the same report is available during the decision making.
3. PPA is signed for 24 MW. What about the PPA for rest of the WTGs. Please explain? As per PPA provided to assessment team of 24 MW it was mentioned that the tariff rate for (Wind- Zone 1) is 5.81(INR/kWH) and after considering AD the net tariff is 5.46(INR/kWH). However, tariff considered is 5.67 (INR/kWH). Kindly explain the discrepancy?
4. As per the PPA for 24 MW the tariff of 5.46 is valid till 13th Year from the date of COD. Please explain how the tariff is considered as same from 15th year onwards in-spite the tariff is not considered as per the PPA signed.
5. The Loan sanction letter presented to the DOE is in excel sheet. Please send us the signed

sanction from the concerned bank to as to cross check the same.

6. The GBI notification from MNRE is for FY 13-14 and the Board decision is taken in FY 12-13. Please explain whether the consideration of GBI is justified. Moreover, no AD is used in financial analysis. Please elaborate.
7. The O&M cost as projected in the IRR sheet is not as per offer letter. Please explain? Moreover, escalation of 5.72% is considered which is not mentioned anywhere in the offer. Please explain?

Following observation is made for Common practice analysis:

1. The N_{wind} data presented is not supported with the link. DOE is unable to assess the presented data. Please provide the same
2. $N_{all}$is also not supported with evidence. Please explain the same in the PD.

Project Participant'sresponse	**Date:**	15/03/2016

1. In line to the operational life of the WTG's IRR is been computed for 25 years. DOE is requested to refer the revised IRR sheets supporting the same.
2. TERI report for 2005/2006 is been provided along with this submission for computation of De-ration of 10%.
3. Tariff considered in financial calculation is in line to the tariff order available at the time of decision making, which is 5.67 for the project in wind zone 1. Wind zone certificate supporting the same is also provided for your reference. Even after considering the actual tariff rate of 5.81 (INR/kWh) in sensitivity analysis, the IRR of the project activity is well below the benchmark and project is still additional in case of actual tariff.
   However, PPA for 56 MW is still under execution, wherein all the clearance has been received from the respective clearing agencies and already shared with the DOE for assessment.
4. PPA is valid for 13 years however on the expiry of the tenure of PPA, state electricity board will renew the PPA based on the prevailing tariff rates.Based on the same project investor have decided to take the same tariff for the entire life. The most likely scenario is to continue the sale of electricity to grid. As a conservative approach, the IRR has been checked with 5% escalation in tariff rate after 13th year PPA and that 5% escalated tariff rate is applied for remaining years and observed that IRR is well below the benchmark.
5. CA certificate supporting, the loan amount is been provided, to DOE for assessment.
6. At the time of decision, there was no any concrete directive about GBI was available, hence the same was not applicable for the project activity for the decision making scenario. However in actual scenario,project activity is eligible for GBI. Hence GBI has been considered for the financial calculations. Also introduction of GBI is conservative for IRR calculations and is appropriate in line with actual scenario of availing GBI for proposed project activity. The IRR with GBI is well below the benchmark.
7. O & M cost is in line to the cost as per the offer letter submitted to DOE for assessment, however values as given in the Offer letter are for each unit of WTG's i.e. per WTG and the same is been extrapolated in the IRR spreadsheet for 40 units of WTGs each of 2 MW capacity. Furthermore escalation in O &M is taken as per the tariff order prevailing at the time of decision making.

For Common Practice :

1. The Nwind data presented in excel sheet is prepared based on the hard copies of wind power directory, its reference is also now provided in the revised joint PD & MR.
2. Nalldata presented in excel sheet is prepared based on the hard copies of wind power directory, its reference is also now provided in the revised joint PD & MR.

Documentation provided as evidence by Project Participant

1. Revised IRR sheet for 25 years of operational life.
2. Copy of TERI report 2005/2006
3. http://www.mercindia.org.in/pdf/Order%2058%2042/MERC_RE%20Tariff%20Order%20(SuoMotu)_for%20FY2012-13_Case%20No.%2010%20of%202012.pdf
4. CA certificate is been provided.

Auditor's assessment comment	**Date:**	17/03/2016

1. Revised IRR sheet for 25 years of operational life is checked by the assessment team
2. Copy of TERI report 2005/2006 is checked by the assessment team
3. http://www.mercindia.org.in/pdf/Order%2058%2042/MERC_RE%20Tariff%20Order%20(SuoMotu)_for%20FY2012-13_Case%20No.%2010%20of%202012.pdfis checked by the assessment team
4. CA certificate is checked by the assessment team

Conclusion by Lead Auditor	**Date:**	17/03/2016

Following observation is made by the assessment team regarding additionality response by PP:

1. The revised IRR sheet is now corrected to the operational lifetime of the WTGs which is 25 year. The same is checked by the assessment team and found correct. CAR is closed
2. The TERI report is checked by the assessment team. The value considered was available at the time of decision making and the considered De-ration rate is correct. CAR is thus closed
3. The tariff considered was available to the PP at the time of decision making. However, assessment team checked the actual tariff signed with the State electricity board and found that even with escalation of minimum 5% in sensitivity the IRR is still below the benchmark. The same is checked in the revised IRR sheet and thus the CAR is closed
4. The most likely scenario is to continue the sale of electricity to grid. As a conservative approach, the IRR has been checked with 5% escalation in tariff rate after 13th year PPA and that 5% escalated tariff rate is applied for remaining years and observed that IRR is well below the benchmark. Moreover, the ideal scenario would be that the prevailing tariff would be continuing after 13 years as per DOE local and sectoral expertise. Based on this observation CAR is thus closed.

5. The CA certificate confirms that the Loan taken from the bank and the one used in the IRR sheet is correct. Although the Loan amount and debt equity ratio is considered as per MERC tariff order however assessment team checked the CA certificate to cross check the loan amount and found correct. Hence CAR is closed.
6. The project is eligible for GBI benefit and thus the same is considered in the IRR sheet. Based on this observation CAR is thus closed
7. O&M cost as mentioned in the offer letter is as per MW. The same is extrapolated in pro-rate basis to project capacity and used in the IRR calculation. The escalation in O&M is as per MERC order prevailing at the time of investment decision. Based on this observation CAR is closed.

Following observation is made by the assessment team regarding common practice analysis response by PP:

1. The Nwind data presented in excel sheet is prepared based on the hard copies of wind power directory, its reference is also now provided in the revised joint PD & MR. The same is checked by the assessment team and found correct. Based on this observation CAR is closed
2. Nalldata presented in excel sheet is prepared based on the hard copies of wind power directory, its reference is also now provided in the revised joint PD & MR. The same is checked by the assessment team and found correct. Based on this observation CAR is closed

The entire CAR related to additionality and common practice is deemed closed.

Type:	☒ **CAR** ☐ **CL** ☐ **FAR**	**Number:**	04
Raised by:	SUKANTA DAS	**Ref. to checklist in table 1&2:**	**Section**
Description of the audit finding		**Date:**	14/03/2016
As per PPA the calibration frequency is annual however in the PD it was mentioned as Once in a five year. Please explain?			
Project Participant'sresponse		**Date:**	15/03/2016
Calibration of energy meters is not in the control of the PP, the State electricity board holds the control of calibration, which however is not been followed at large. However to cover the national standards, as per the CEA notification, calibration frequency is kept as 5 years.			
Documentation provided as evidence by Project Participant			
CEA web link. http://www.cea.nic.in/reports/regulation/meter_reg.pdf			
Auditor's assessment comment		**Date:**	17/03/2016

CEA web link. http://www.cea.nic.in/reports/regulation/meter_reg.pdf is checked by the assessment team and found correct.		
Conclusion by Lead Auditor	**Date:**	17/03/2016
As mentioned by PP and as per the DOE local and sectoral expertise it is correct that the calibration is not in the hand of PP and thus as a conservative approach the national regulation is followed. As guideline allows national regulation as appropriate thus the same is acceptable to the assessment team and this CAR is closed.		

Type:	☒ **CAR** ☐ **CL** ☐ **FAR**		**Number:**	05
Raised by:	SUKANTA DAS	**Ref. to checklist in table 1&2:**		**Section**
Description of the audit finding			**Date:**	14/03/2016
The emission reduction value as mentioned in the ER sheet is not correct. Please modify the same as per the JMR records/credit notes/invoices for the complete monitoring period. Corrective action is sought regarding the same.				
Project Participant'sresponse			**Date:**	15/03/2016
Emission reduction values in line to the JMR records are now corrected.				
Documentation provided as evidence by Project Participant				
1. JMR records 2. Invoices 3. Emission reduction sheet				
Auditor's assessment comment			**Date:**	17/03/2016
1. JMR records is checked by the assessment team 2. Invoices is checked by the assessment team 3. Emission reduction sheet is checked by the assessment team				
Conclusion by Lead Auditor			**Date:**	DD/MM/YYYY
All the JMR reports and the invoices are checked by the assessment team and ER sheet now complies with the same. Based on this observation CAR is thus closed.				

Type:	☒ **CAR** ☐ **CL** ☐ **FAR**	**Number:**	06
Raised by:	SUKANTA DAS	**Ref. to checklist in table 1&2:**	**Section**
Description of the audit finding		**Date:**	14/03/2016

During the site visit and subsequent document review it was observed that the details of feeder wise WTGs location is missing in the MR.

During the site visit and subsequent document review it was observed that the calibration details of the site meters are missing for the complete monitoring period. Corrective action is sought in the respective section of the MR and supporting documents for further analysis.

The breakdown details of the WTGs are missing in the MR. Moreover, the supporting document regarding the breakdown details are also not provided to the assessment team. Corrective action is sought in the respective section of the MR and supporting documents for further analysis.

Project Participant'sresponse	**Date:**	15/03/2016

Feeder wise WTGs location is updated in revised joint PD & MR.

Calibration details of meters is been updated, in MR. Since the calibration frequency is once in five years as per CEA guideline, calibration & testing done at the time of commissioning is still valid for the current monitoring period.

Break down details are provided in separate excel sheets.

Documentation provided as evidence by Project Participant

1. Break down details
2. Combined VCS and MR report version 02

Auditor's assessment comment	**Date:**	17/03/2016

1.Break down details is checked by the assessment team
2. Combined VCS and MR report version 02 is checked by the assessment team

Conclusion by Lead Auditor	**Date:**	17/03/2016

Feeder wise WTGs location is updated in revised joint PD & MR. The same is checked by the assessment team and found correct.

Calibration details of meters is been updated, in MR. Since the calibration frequency is once in five years as per CEA guideline, calibration & testing done at the time of commissioning is

still valid for the current monitoring period. The same is checked by the assessment team and found correct.

Break down details are provided in separate excel sheets. The machine undergone scheduled maintenance and there is claim of ER during the shutdown period which is a conservative approach. The same is checked by the assessment team and found correct.

Based on the above observation CAR is thus closed.

APPENDIX 3:

Competence of team members and technical reviewers

Validationteammember

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)	Verificationfindings
1.	Team Leader	OR	DAS	SUKANTA	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)	IR	Sitjes	Miquel	Applus+ LGAI
2	TR in Training	IR	Rodrigo Vega	Ms. Natalia	Applus+ LGAI
2.	Approver	IR	Sendin	Juan	Applus+ LGAI

Short CVs of the Team:

1. Mr. Sukanta DAS, has done M. SC in (Electronics and Photonics) and M. Tech in (Energy technology) from Tezpur Central University/ Indian Institute of technology Bombay in India. He is a certified lead auditor for ISO 14001 EMS LA and ISO 9001 QMS LA from International registry for Certified Auditors (IRCA) and Certified Lean Management practitioner from Quality Council of India (QCI). He has more than eight years of working experience at TUV NoRD/ Re-consult/CRA/APPLUS certifications under various categories of projects stating from Renewable

to waste to supercritical projects. He was JI/ CDM Lead Assessor in TUV NoRD and was involved in more than 100 CDM validation and verifications activities in Gold Standard, VCS, CDM projects as a team leader/technical reviewer / validator / verifier covering the sectoral scope 1, 13 technical areas 1.2/1.1/13.1. Currently he is associated with True Quality Certifications Private Limited and is empanelled with APPLUS certification to carry out GHG audit.

2. Mr. Miquel Sitjes Cabanas has a Bachelor Science degree in Chemistry by the Universidad de Barcelona - Spain (1975). He has 15 years of experience in a Spanish chemical group company specialized in the manufacturing of raw chemical products, where he worked as the Manager of Production and Quality and Environmental Control. He also worked in the Spanish pharmaceutical industry for 7 years as Quality, Manufacturing and Environmental Manager. Currently, he works for Applus+ LGAI Technological Center since 1999. Since 2006, he is the Technical Manager of Applus+LGAI, working under quality, and environmental standards such as ISO 9001, ISO 14001, GHG Verification, CDM, VCS and GS.

3. Ms. Natalia Rodrigo Vega has a Bachelor's Degree on Environmental Engineering and Master´s Degree on Environmental and Quality Management System (under ISO 9001 and 14001).She Works in Applus Environmental and Quality Management Systems Department since March 2012, being specially involved on technical support tasks related to CDM-VCS and GS Standards, among others (i.e. GHG verification and ProyectoClima)

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
MSEDCL	Maharashtra State Electricity Distribution

	Company
JMR	Joint Metering reading
RBI	Reserve Bank Of India
PP	Project Participant