

JOINT VALIDATION & VERIFICATION REPORT FOR

“THEPARAK WIND IN THAILAND”



Document Prepared By Earthood Services Private Limited

Project Title	Theparak Wind in Thailand
Report Title	Joint Validation and Verification report for “Theparak Wind in Thailand”
Version	01
Report ID	VCS.VAL.19.35
Verification Period	27-November-2018 to 31-October-2019 (inclusive of both the dates)
Client	Kosher Climate India (P) Limited
Pages	50
Date of Issue	17/12/2019
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Summary:

Earthood Services Private Limited (hereafter referred to as ESPL) has been contracted by Kosher Climate India (P) Limited (Representative of Project proponent and the focal point of communication with VCS) to conduct the validation and verification of the project - "Theparak Wind in Thailand" (hereinafter also referred to as Project Activity), with regard to the relevant requirements of VCS programme guidelines and standard (VCS standard version 3.7, & VCS program guide version 3.7)/18/. Relevant requirements of the UNFCCC for CDM project activities, as well as criteria for consistent project operations, monitoring and reporting has been applied for validation and verification.

The monitoring period covered under this verification is from 27/11/2018 to 31/10/2019 (both the days inclusive).

The verification includes confirming the implementation of the monitoring plan of the validated VCS joint PD and MR (Project pipeline ID 2002) and the application of the monitoring methodology as per ACM0002 version 19.0: "Grid-connected electricity generation from renewable sources". A site visit was conducted to verify the data submitted for validation and in the monitoring report.

The proposed project activity involves the installation of Wind Turbine Generators (WTG) in Nakhon Ratchasima of Thailand (T1 Wind farm). The project is developed by Theparak Wind Co., Ltd, Thailand. Theparak Wind Co., Ltd is a subsidiary of Wind Energy Holding Co., Ltd. The purpose of the project activity is to generate clean electricity with utilization of wind energy. The project consists of 30 numbers of GE 137 Wind Turbine Generators (WTGs) of 3.0 MW capacities each. The project WTGs are installed in the Nongwang, Bueng Prue and Samnaktakhro sub-districts of Thepharak District, Nakhonratchasima Province in Thailand. All the WTGs of the project activity were commissioned on 27/11/2018. The same was verified against the commissioning certificate/07/ and PPA/08/.

Thus the project aims to displace electricity produced by fossil fuel power plants harnessing wind energy. Therefore, the project reduces greenhouse gas emissions and thereby contributes to sustainable development. The project being a renewable energy generation activity, leads to reduction in fossil fuel dominated electricity generation. The project activity results in reductions of greenhouse gas (GHG) emissions that are real, measurable, and verifiable and also plays beneficial role in the mitigation of climate change.

The project proponent has applied the baseline and monitoring methodology ACM0002, Version 19.0.0: "Grid-connected electricity generation from renewable sources".

The project activity is a Green field project which results in an estimated GHG emission reduction of 156,167 tCO₂e per year (the calculated annualized average value as per ex-ante calculation) and a total of 1,561,670 tCO₂e over 10 years of the crediting period. The power generated by the project will be replacing the equivalent amount of electricity from the Grid system of Thailand, which is dominated by fossil fuel based grid connected power plants.

A risk based approach has been followed to perform this combined validation & verification. In the course of validation & verification, 07 Corrective Action request (CARs) and 02 Clarification request (CLs) were raised and successfully closed.

The review of the project design documentation, monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and stakeholders have provided ESPL with sufficient evidence to validate the fulfillment of the stated criteria.

In detail the conclusions can be summarized as follows:

- The project is in line with all relevant host country criteria (Thailand) and all relevant VCS and UNFCCC requirements for CDM
- The project additionality is sufficiently justified in the VCS joint PD & MR document.
- The monitoring plan is transparent and adequate.
- The calculation of the emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 1,561,670 tCO₂e are most likely to be achieved within the 10 years crediting period. Also, due to expected longer technical lifetime of the project, project can be further renewed under VCS crediting period.

Validation & Verification Conclusion:

The conclusions of this report show, that the project, as it was described in the project documentation and monitoring report, is in line with all criteria applicable for the validation and verification. This validation and verification are based on the information made available to ESPL and the engagement conditions are detailed in this report. No restrictions or uncertainties were identified related to the validation and verification.

ESPL confirms that the project is implemented in accordance with the validated VCS joint PD & MR version 2.1 dated 16/12/2019. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 136,087 tCO₂e during period 27/11/2018 to 31/10/2019.

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1 INTRODUCTION

1.1 Objective

ESPL has been contracted by Kosher Climate India (P) Limited (Representative of Project proponent, to undertake the validation and verification of the renewable energy project titled “Theparak Wind in Thailand” (which was under the VCS pipeline with ID PL2002). The verifiers have reviewed the GHG data collected for the monitoring period from 27/11/2018 to 31/10/2019 (both days included) covered in this verification.

The purpose of this validation and verification is to have an independent third party assessment of whether the project activity conforms to the qualification criteria set out in the VCS Version 3.7 standard/18/ to attain real, measurable, additional and permanent emission reductions. The validation/verification statement/opinion is a written assurance that:

- The project complies with all the applicable VCS requirements and has the ability to generate the emission reductions stated over the project's crediting period.
- The validation followed the requirements of the current version of the VCS Standard Version 3.7 and VCS program guide 3.7/18/ to ensure the quality and consistency of the validation work and the report.
- The project has resulted in emission reductions as declared by the organisation or GHG project's GHG assertion;
- The data reported is accurate, complete, consistent, transparent and free of material error or omission.

1.2 Scope and Criteria

For validation:

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan which is included in the VCS joint PD & MR and other relevant supporting documents.

The scope of work covered in the validation is described below:

- To validate whether the project activity meets the requirements of VCS Standard Version 3.7, VCS Validation and VCS program guide 3.7/18/ including additionality, proof of title and compliance with local laws.
- To evaluate whether the baseline and monitoring plan are in conformance with the applied methodology from the VCS approved GHG program
- To confirm that the information presented are completed, consistent, transparent and free of omission or material error
- Background investigation and follow up interviews
- Issuance of draft validation report with CARs, CRs & FARs, if any
- Final validation opinion

The information in the VCS joint PD & MR is reviewed against the criteria of VCS Standard 3.7, the VCS program guide 3.7/18/ and the approved baseline and monitoring CDM methodology ACM0002, version 19.0.

ESPL has performed validation based on a risk based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate Verified Carbon Units (VCUs).

For Verification:

The scope of the verification was the independent and objective review and ex-post determination of the monitored reductions in GHG emissions from “Theparak Wind in Thailand”. The verification of this project was based on the validated VCS joint project description & monitoring report /01/ and supporting documents submitted by the project proponent to the verification team. The documents were reviewed against the following guidance and protocols:

- VCS Standard: Version 3.7, dated 21 June 2017/18/
- Approved baseline and monitoring methodology ACM0002 version 19.0, “Grid-connected electricity generation from renewable sources”.
- Validated VCS joint Project Description & monitoring report version 2.1 dated 16/12/2019
- VCS Program Guide, Version 3.7, dated 21 June 2017
- ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

The validation & verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Level of Assurance

The validation has been planned and organized to achieve a

☒ Reasonable level of assurance

☐ Limited level of assurance.

1.4 Summary Description of the Project

The proposed project activity involves the installation of Wind Turbine Generators (WTG) in Nakhon Ratchasima of Thailand (T1 Wind farm). The project is developed by Theparak Wind Co., Ltd, Thailand. Theparak Wind Co., Ltd is a subsidiary of Wind Energy Holding Co., Ltd.

The purpose of the project activity is to generate clean electricity with utilization of wind energy. The project consists of 30 numbers of GE 137 Wind Turbine Generators (WTGs) of 3.0 MW capacities each. The project WTGs are installed in the Nongwang, Bueng Prue and Samnaktakhro sub-districts of Thepharak District, Nakhonratchasima Province in Thailand.

All the WTGs of the project activity were commissioned on 27/11/2018.

The commissioning certificate/07/ and power purchase agreement/08/ are reviewed by the verification team and found to be appropriate. The verification team has also conducted onsite observation and physically verified the project equipment(s) and monitoring arrangements. The project activity was found to be implemented as it has been defined in the joint VCS PD & MR /01/.

The estimation of GHG reductions by this project is limited to carbon dioxide (CO₂) only. Thus the project activity leads to an emission reduction of 156,167 tCO₂ per year or 1,561,670 tCO₂ for the chosen crediting period of 10 years.

The current monitoring period chosen is from 28-December-2018 to 31-October-2019 (inclusive of first & last date) and the GHG emission reductions calculated are 136,087 tCO₂.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

For Validation:

The validation process is undertaken by validation team that involves the following:

- The desk review of documents and evidences submitted by the project proponent in context of the reference VCS rules and guidelines,
- Undertaking site visit, interview or interactions with the representative of the project proponent,
- Reporting audit findings with respect to clarifications and non-conformities and the closure of the findings, as appropriate and
- Preparing a draft validation report
- Resolution of outstanding issues and the issuance of final verification report and opinion

In order to ensure transparency, a validation protocol was prepared for the project according to the VVS for PAs version 02.0 verification requirements and VCS Standard version 3.7/18/. The Clarification Requests (CL) were issued where additional information was needed to clarify issues, and Forward Action Requests (FAR) for issues relating to project implementation that required review during the first verification of the project activity.

For Verification:

The verification approach consists two phases.

- In the first phase, ESPL completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of:
- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the Monitoring Report.

At the end of this phase, ESPL produced a Verification Checklist which, based on the risk assessment of the parameters and data collection and handling processes for each of those parameters, describes the verification approach and the sampling plan.

Using the Verification checklist, ESPL verified the implementation of the monitoring plan and the data presented in the Monitoring Report for the period in question. This involved a site visit and a desk review of the Monitoring Report. This verification report describes the findings of this assessment.

2.2 Document Review

For Validation:

The validation team has conducted the validation using the VCS Standard and the ACM0002 version 19.0 methodology as the reference criteria. The validation team had done the completeness check of VCS joint PD & MR submitted by the PP as per the VCS standard Version 3.7/18/ requirements was reviewed. Furthermore, a desk review was also carried out to assess the following:

- Information of project details in compliance with VCS joint PD & MR template
- Appropriateness of methodology ACM0002 version 19.0 applied to the project activity
- Compliance with relevant laws and regulations
- Correctness of application of baseline and monitoring methodology
- Demonstration of additionality
- Monitoring plan described in the VCS joint PD & MR
- Stakeholder consultation
- Proof of listing of project under pipeline
- Calculation of grid emission factor, etc. where applicable.

The VCS joint PD & MR version 01.2 dated 17/11/2019 /01/ was initially reviewed and the PP requested to submit the revised documents along with the supporting information and documents. The revised documents and additional supporting documents were further assessed by the validation team during des review as well as verified physically during site visit. During the validation process, the revised VCS joint PD & MR (version 02.1, dated 16/12/2019) /01/ and the supporting documents were assessed to confirm the actions taken by the PP to the CARs and CLs issued.

The validation team has reviewed the final version of the VCS joint PD and MR (i.e. Version 2.1 dated 16/12/2019) to confirm that all changes agreed have been incorporated adequately.

Further, prior to the onsite visit, it was verified by the validation team that the project was listed in the VCS pipeline in line with the requirements (Section 3, Registration and Issuance process, version 3.8) Ref: https://www.vcsprojectdatabase.org/-/pipeline_details/PL2002.

For Verification:

The validated VCS joint PD & MR /01/ (version 2.1 dated 16/12/2019) and additional supporting documents related to the project performance submitted by the client were reviewed.

The details of the documentation reviewed during the validation & verification are provided under Appendix 1 of this report.

2.3 Interviews

The assessment team has carried out interviews in order to verify the information included in the project documentation and to gain additional information regarding the compliance of the project with the VCS requirements. Before and during the on-site visit, the assessment team has interviewed the representatives of the PP to confirm selected information and to clarify issues identified during the document review. Representatives of the PP and O&M contractor were also interviewed. The names and designations of the personnel interviewed are mentioned in section 2.4 below.

The main topics covered during the interview are as follows:

- General Aspects of the project
- Project Implementation
- Equipment and operation
- Staff Training procedures
- Calibration procedures
- Monitoring & Measuring System
- Data collection, recording and archiving procedure
- QA/QC procedures
- VCS documentation
- Emission reduction calculations

2.4 Site Inspections

As part of the validation & verification, an on-site inspection has been performed by the assessment team. The site visit was carried out on 11/12/2019. During the site visit representatives of the PP and O&M contractors were interviewed; i.e. personnel responsible for monitoring of the project activity, data collection and management, and QA/QC procedure. The details of the people interviewed, and the topics discussed are mentioned in the table below:

Location: Village/ Taluk: Nongwang, Bueng Prue and Samnaktakhro sub-districts of Thepharak District, Nakhonratchasima Province in Thailand	Date: 11/12/2019
Coverage	Source of Information / Persons Interviewed
Project implementation start date as per the VCS requirements.	Mr. RAPEE PAWANRUM (PLANT MANAGER)
Electricity Generation Records (monthly energy statements, Invoices)	Mr. NARONG SANGPAN (PLANT MANAGER)
Reliability & accuracy of readings considered for emission reduction calculations, Calibration procedure	
Monitoring and measuring system - Collection of measurements - Observations of established practices - Data Verification of monitoring parameters	Ms. PANIS MIAKKHUNTHOD (OPERATIONS) Ms. WATSANA SANSRI (OPERATIONS)
QA/QC procedures, data management, internal audits to maintain data quality & reliability, maintenance Practices	Mr. RAPEE PAWANRUM (PLANT MANAGER)
Consideration of monitoring period, monitoring methodology, project documentation and emission reduction calculations	Mr. NARONG SANGPAN (PLANT MANAGER)
Documentation Review and verification of data/information with the original documents	Ms. PANIS MIAKKHUNTHOD (OPERATIONS) Ms. WATSANA SANSRI (OPERATIONS)

2.5 Resolution of Findings

As an outcome of the validation & verification process, the team can raise different types of findings:

A Clarification Request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met

Where a non-conformance arises the team leader shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The VCS requirements have not been met;
- There is a risk that emission reductions cannot be monitored or calculated.
- The validation process may be halted until this information has been made available to the team leader's satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR. No CL has been raised during the validation of the project activity.

During the validation and verification process, total 07 CAR and 02 CL were raised and resolved satisfactorily. The list of CARs/CLs/FARs raised and the response provided, the mean of validation, reasons for their closure and references to correction in the relevant documents are provided in Appendix 4 of this report.

2.5.1 Forward Action Requests

A Forward Action Request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the VCS requirements for registration.

No FAR has been raised during the validation and verification of this project activity.

3 VALIDATION FINDINGS

3.1 Project Details

Project type, technologies and measures implemented, and eligibility of the project:

As per the project type defined by the UNFCCC and VCS standard version 3.7/18/ Guidelines, the project activity is falls under type-I (Renewable energy projects) and the list of Sectoral the sectoral scope 1 - Energy Industries (renewable/ non-renewable sources).

The project activity consists of the installation of 90 MW wind power project consisting of 30 Wind Turbine Generators (WTGs) of individual capacity 3.0 MW. The project activity has already been commissioned as mentioned in section 1.4 of this report and it is found to be running satisfactorily. This is checked and confirmed from the commissioning certificates/07/ of the project activity, also verified during the site visit.

The project activity is a Green field project which results in an estimated GHG emission reduction of 156,167 tCO₂e per year (the calculated annualized average value as per ex-ante calculation) and a total of 1,561,670 tCO₂e over 10 years of the crediting period.

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 project activity is the installation of an environmentally safe and sound technology since there are no GHG emissions associated with the electricity generation.

The technical specifications of the WTGs have been provided as below

GE 137-3.0 MW	
Rated power:	3.0 MW
Rotor diameter	137 m
Number of blades	3
Swept area	14741 m ²
Rotational director	Clockwise (viewed from an upward wind location)
Maximum speed of the blade tips	82.1 m/s
Orientation	Upwind
Speed regulation	Pitch control
Aerodynamic brake	Full feathering
Color of outer components	RAL 7035 (light gray)
Reflection degree/Gloss degree of steel tower	30-60 units measured at 60 degree per ISO2813
Reflection degree/Gloss degree of Rotor blades, nacelle, Hub	60-80 gloss units measured at 60 degree per ISO2813
Reflection degree/Gloss degree of Hybrid tower	15-30 gloss units measured at 60 degree per ISO2813

The purpose of the project activity is to generate the electricity by the utilization of wind power and is being supplied to Thailand national grid and sold to the EGAT. The life time of the Project is 25 years. The project activity will generate greenhouse gas (GHG) emission reductions by avoiding GHG emissions which otherwise would have been generated by the operation of grid connected power plants and by the addition of new sources. Hence the project accomplishes VCS conditions.

Project proponent and other entities involved in the project:

The project activity is developed by Theparak Wind Power Co., Ltd.

Theparak Wind Power Co., Ltd. is the Project Proponent (PP) having overall operational control and ownership of the Project activity.

Another entity “Kosher Climate India (P) Limited” is also involved into the project activity. Kosher Climate is the “Authorized Representative” of PP and the “Sole Focal Point” for all the communications with the DOE, VCS Board and Registry; and to take all the necessary actions for the project under VCS mechanism as and when required. Communication Agreement/24/ has been signed in between the parties.

Project start date:

The start date for this project is 27-November-2018. This is the date of commissioning of the project.

Project crediting period-

The crediting period of the project activity is considered for 10 years (renewable) which can be renewed for maximum 2 times. The first crediting period is from 27/11/2018 to 26/11/2028.

Project scale and estimated GHG emission reductions or removals:

The estimated annual emission reductions for the project activity are 156,167 tCO₂e per year (proposed annualized average value) is less than 300,000 tCO₂e. Hence the category/scale of the project is applicable under “Small Scale Project”.

Project location:

The project WTGs are installed in the Nongwang, Bueng Prue and Samnaktakhro sub-districts of Thepharak District, Nakhonratchasima Province in Thailand. The geo-coordinates of the project location are as follows:

S.No	WTG ID	Latitude N	Longitude E	Sub-District	District
1	T1-001	15.242054	101.460692	Nongwang	Thepharak
2	T1-002	15.246658	101.456607	Nongwang	Thepharak
3	T1-003	15.256905	101.452232	Nongwang	Thepharak
4	T1-005	15.254707	101.455412	Nongwang	Thepharak
5	T1-006	15.258259	101.463981	Nongwang	Thepharak
6	T1-008	15.263423	101.451656	Nongwang	Thepharak
7	T1-009	15.260403	101.452248	Nongwang	Thepharak
8	T1-010	15.266278	101.450251	Nongwang	Thepharak
9	T1-012	15.269408	101.449759	Nongwang	Thepharak
10	T1-014	15.277282	101.452011	Bueng Prue	Thepharak
11	T1-015	15.271481	101.47077	Nongwang	Thepharak
12	T1-016	15.27439	101.466817	Nongwang	Thepharak
13	T1-017	15.280839	101.450052	Bueng Prue	Thepharak
14	T1-020	15.26096	101.463356	Nongwang	Thepharak
15	T1-021	15.29131	101.452738	Bueng Prue	Thepharak
16	T1-022	15.287584	101.454698	Bueng Prue	Thepharak
17	T1-101	15.254172	101.468782	Nongwang	Thepharak
18	T1-102	15.250278	101.454386	Nongwang	Thepharak
19	T1-103	15.283807	101.489087	Bueng Prue	Thepharak
20	T1-104	15.285599	101.485604	Bueng Prue	Thepharak
21	T1-106	15.283887	101.473835	Bueng Prue	Thepharak
22	T1-108	15.305588	101.483107	Bueng Prue	Thepharak
23	T1-109	15.3008	101.484177	Bueng Prue	Thepharak
24	T1-110	15.297277	101.484846	Bueng Prue	Thepharak

25	T1-111	15.300758	101.479076	Bueng Prue	Thepharak
26	T1-112	15.297185	101.502467	Samnaktakhro	Thepharak
27	T1-113	15.293929	101.501811	Bueng Prue	Thepharak
28	T1-114	15.289313	101.50348	Samnaktakhro	Thepharak
29	T1-115	15.283835	101.50148	Samnaktakhro	Thepharak
30	T1-119	15.308079	101.492939	Bueng Prue	Thepharak

Conditions prior to project initiation:

The project is Greenfield project. There was no project installed prior to commissioning of this project. The project activity is set up to produce clean power from the wind energy converters (WEC's) which can be also named as Wind Turbine Generator (WTG). The project activity involves supply, erection, commissioning and operation of 30 machines of rated capacity 3 MW each totalling an installed capacity of 90 MW.

The project does not generate any GHG emissions and hence it can be said that the project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

In the absence of the project activity the equivalent amount of electricity sold to grid would have been generated by grid connected power plants (which is predominantly based on fossil fuels) and by the addition of new generation sources.

Project compliance with applicable laws, statutes and other regulatory frameworks:

The power sector in Thailand is regulated by Energy Industry Act, B.E. 2550 (2007). The Energy Industry Act, 2007, does not restrict the choice of fuel for power generation. Moreover, it does not mandate electricity generation from wind projects, although it promotes the use of renewable sources of energy. Hence, no national or sectoral policies prevent the implementation of either the baseline or the project activity.

The Electricity Generating Authority of Thailand Act, B.E. 2511 (1968) permits the Electricity Generating Authority (EGAT) of Thailand to promulgate regulations in accordance with its objectives, relating primarily to the purchase of electricity from independent producers and the operation of the transmission system network

As per the Electricity Generating Authority of Thailand (EGAT) regulations, the project falls under Small Power Producer (SPP) category as the project capacity is between 10-90 MW. As per the requirements of EGAT the project received all the necessary approvals for development of wind energy project which are listed below:

- License to operate the SPP with EGAT
- Factory license (ror ngor 4)
- Certificate of Building Construction
- Energy Industry Operation, Controlled Energy Production, Electricity Industry Operation License
- Certificate of Electricity Quality

The project complies with all relevant local and national laws & regulations in Thailand.

Ownership and other programs-

Right of use

The Project is developed and owned by Theparak Wind Power Co., Ltd, who authorizes Kosher Climate India (P) Limited as the authorized representative of project proponent for the VCS project, and to receive VCUs and remain focal point of communication at the registry /24/.

The ownership of the project activity is verified through the following documents:

- Commissioning certificates for the Wind projects in the name of Theparak Wind Power Co., Ltd/07/
- Power Purchase Agreement with EAGAT by Theparak Wind Power Co., Ltd /08/
- Purchase order issued by the PP to technology supplier/14/

Emissions trading programs and other binding limits

The project is not participating in other emission trading programs. The letter of undertaking/19/ has been furnished by project participant confirming that net GHG emission reductions or removals generated by the project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions.

Other forms of environmental credit sought or received and eligible to be sought or received:

The project seeking registration under the VCS (Pipeline ID-2002)

Participation under other GHG programs:

Project is seeking registration under VCS only (Pipeline ID-2002). The PP has submitted the declaration/19/ which states that the net GHG emission reductions generated by the project activity will not be used for compliance with any other emissions trading program or to meet binding limits on GHG emissions for the same monitoring period.

Rejection by other GHG programs:

The project has not been rejected by other GHG programs.

Additional information relevant to the project, including:

- **Eligibility criteria for grouped projects**

The project activity is not a grouped project, hence not applicable to the project activity.

- **Leakage management for AFOLU projects**

Not applicable to the project activity.

- **Commercially sensitive information**

No commercially sensitive information has been excluded from the public version of the project description.

Conclusion:

In view of the assessment of VCS Joint PD & MR/01/ and supporting documents as listed in Appendix 1 of this report, the validation team is able to confirm that the description contained in the VCS joint PD & MR of the project activity provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation. Consequently, ESPL confirms that the project description of the project contained in the joint VCS PD& MR/01/ to be complete and accurate. The VCS joint PD & MR complies with the relevant forms and guidance for completing the VCS joint PD & MR.

3.2 Participation under Other GHG Programs

The project activity is seeking registration under VCS programme only. The start date of the project activity is 27/11/2018 This is the date of commissioning of the wind project

During the verification process, the verification team has reviewed the declaration submitted by the project proponent confirming that GHG emission reduction credits from the Project have not been registered under another GHG program. It can be concluded that the project is eligible to participate under the VCS Program.

3.3 Application of Methodology

3.3.1 Title and Reference

The project activity has applied CDM approved methodology Version 19.0, EB100

Title: Grid-connected electricity generation from renewable sources

Tools referenced in the applied methodology:

- Tool to calculate the emission factor for an electricity system - Version 07.0 (EB 100, Annex 04)
- Methodological Tool- Tool for the demonstration and assessment of additionality - Version 07.0.0 (EB 70, Annex 08)

3.3.2 Applicability

All applicability conditions of the updated version of the methodology (ACM0002 version 19.0) are met. Thus the methodology is deemed fully applicable for the new crediting period and no request for deviation with regards to the applicability of the methodology is required. All applicability conditions are completely and correctly included in the joint VCS PD & MR.

Criteria-1.

This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).

Validation assessment:

- Project activity is Greenfield wind power project, supplying electricity to Thailand national grid. This is verified thorough the Power purchase Agreements /08/ and commissioning certificates/07/.

Thus the criterion is fulfilled by the project activity.

Criteria-2:

The methodology is applicable under the following conditions:

(a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;

(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.

Validation assessment:

The project activity is the installation of a new Wind power plant. This is confirmed through the purchase order/14/ and commissioning certificates/07/.

Thus the criterion (a) is applicable and (b) is not applicable for the project activity.

Criteria-3, Criteria 4, Criteria 5 and Criteria 6:

The methodology is not applicable to these criteria given under the methodology as project is only a solar power project, not related to any hydro power generation.

Validation assessment:

The project activity is the installation of a new wind power plant and does not involve in any hydro power generation. This is confirmed through the purchase order/14/ and commissioning certificates/07/.

Criteria-7:

The methodology is not applicable to these criteria given under the methodology as project is only a solar power project, not related to any hydro power generation.

(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;

(b) Biomass fired power plants/units.

Validation assessment:

The project activity is the installation of a new wind power plant and does not involve switching from fossil fuels to renewable energy sources at the site of the project activity. This is confirmed through the purchase order/14/ and commissioning certificates/07/.

Thus the criterion is not applicable for the project activity.

Criteria-8:

In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance."

Validation assessment:

The project activity does not involve any capacity additions, retrofits or replacements of an existing facility because it is a Greenfield wind power generation project activity; same has been confirmed from physical inspection during the validation site visit.

Thus the criterion is not applicable for the project activity.

The project activity is the installation of a wind-based Power Generation project; it is not a hydro project, thus all conditions related to hydro plants are not applicable to the project activity (and not included in this section).

Thus, it can be concluded that the applied methodology ACM0002, version 19.0 is applicable to the project activity.

Further, the applied methodology refers to latest available versions of the following tools;

1. Tool to calculate the emission factor for an electricity system

The joint VCS PD & MR/01/ refers and correctly applies the latest version of tool to calculate the emission factor for an electricity system, version 07.0 /05/. Also in the final version of the Joint VCS PD & MR, the PP has referred the Thailand Grid Emission Factor for GHG Reduction Project/Activity' dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation). This is the latest available database at the time of revised version of the VCS Joint PD & MR submission for validation of the project activity. The location of the project is in the Nongwang, Bueng Prue and Samnaktakhro sub-districts of Thepharak District, Nakhonratchasima Province in Thailand. As per Thailand Grid Emission Factor for GHG Reduction Project/Activity' dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation /16/, the Nakhonratchasima comes under the Thailand national grid,

the geographic and system boundaries of which are clearly identified; information on the characteristics of the grid is available. Thus, the tool is applicable for the project activity.

2. Tool for the demonstration and assessment of additionality

The latest version 7.0.0 of the “Tool for the demonstration and assessment of additionality”/11/ has been used by the PP. Since the additionally tool is included in an approved methodology, additionality tool needs to be applied for the project activity. Also PP is neither proposing new methodology nor proposing alternative methods to demonstrate additionality for consideration by the Executive Board. This it is concluded that the Tool for the demonstration and assessment of additionality is applicable for the project activity.

3. Combined tool to identify the baseline scenario and demonstrate additionality

The PP has used the “Tool to demonstration and assessment of additionality” in demonstration of additionality and the baseline has been developed in accordance with the applied baseline methodology. Hence, the combined tool is not used by the project participant.

4. Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion

Since there is no fossil fuel combustion involved in the project site or in the project boundary, this tool is not applicable to the project activity and not used/applied by the project participant.

3.3.3 Project Boundary

The project boundary is given by the applied methodology, ACM0002, version 19.0.0:

“The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.”

The project boundary includes the wind project, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the Thailand national grid. Therefore, the entire Thailand national grid and all connected power plants have been considered in the project boundary for the proposed VCS project activity, thereby displacing the grid generated electricity. The project boundary includes the wind project, sub-stations, grid and all power plants connected to grid, which has been illustrated in the Section 2.3 of the joint VCS PD & MR/01/ and gives clear understanding of the project boundary; thus it is acceptable. The same has been confirmed during the site visit and is found to be appropriate.

The consideration, by the PP, of only CO₂ gas for the baseline emissions is conservative and also in line with the methodology. The exclusion of CH₄ & N₂O in the baseline scenario is appropriate. The project activity involves the generation of electricity using wind energy. Hence, there are no project emissions associated with this project activity. Hence, the exclusion of CO₂, CH₄ & N₂O in the project scenario are appropriate. There are no other sources of project emissions. Hence, the project participant has considered the project emissions as zero for project activity; this is in line with the methodology.

The assessment team is able to conclude that the project boundary and selected sources are applied as per the methodology and the applicable VCS criteria.

3.3.4 Baseline Scenario

The project activity involves the installation of a newly built and grid-connected renewable power plant (i.e. wind) and supplying the generated electricity to Thailand national grid, hence, according to the applied methodology ACM0002, version 19.0.0, the baseline scenario is determined properly as:

“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”..”

The latest available version for “Tool to calculate the emission factor for an electricity system” is version 07.0 /05/ and the PP has correctly referred to the same in the section 3.1 of the final VCS joint PD & MR /1/ for determining baseline grid emission factor and it is found to be correct.

The PP has used the Thailand Grid Emission Factor for GHG Reduction Project/Activity’ dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation) data for Grid emission factor. The baseline emission factor for the electricity system has been calculated on ex-ante basis and will remain fixed for the entire project crediting period.

The combined margin of the Thailand national grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
EF _{grid,CM,y}	0.5692 tCO ₂ /MWh	Combined margin CO ₂ emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Report ‘Thailand Grid Emission Factor for GHG Reduction Project/Activity’ dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation)/16/
EF _{grid,OM,y}	0.5719 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2014, 2015 & 2016) generation-weighted average, sourced from Report ‘Thailand Grid Emission Factor for GHG Reduction Project/Activity’ dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation) /16/
EF _{grid,BM,y}	0.5609	Build margin CO ₂ emission	Report ‘Thailand Grid Emission Factor for GHG Reduction Project/Activity’ dated 28/09/2017 Published by Thailand

	tCO ₂ /MWh	factor for the project electricity system in year y	Greenhouse Gas Management Organisation (Public Organisation) /16/
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The discussion on baseline is comprehensive in the VCS joint PD & MR section 3.1 and it is in line with the applied baseline and monitoring methodology ACM0002 version 19.0.0. Also the identified baseline for the project activity is the most likely scenario of what would have occurred in the absence of the project activity and is confirmed by TA expert on the team; thus it is accepted. The project participant has included all sources and references used for baseline determination for the project activity in the PD/1/ and the identified baseline is justified appropriately by the project participant. The Baseline scenario and baseline emission calculations are found as per ACM0002 version 19.0.0/4/. The combined margin approach is the ex-ante approach as per tool to calculate the emission factor for an electricity system. Based on the requirements of paragraph 83 of the VVS version 02.0 /10/, the validation team confirm that:

- (a) All the assumptions and data used by the PP are listed in the VCS joint PD & MR, including their references and sources;
- (b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PD;
- (c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;
- (d) Relevant national and/or sectoral policies and circumstances are considered and listed in the PD;
- (e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the project activity.

3.3.5 Additionality

The project activity is a small scale project and the additionality of the project activity was demonstrated on the basis of the “Tool for the demonstration and assessment of the additionality”, Version 07.0.0, approved by the CDM EB 70 and required by the methodology ACM0002, Version 19.0.0.

PP has adopted the stepwise approach for demonstrating and assessing the additionality of the project activity as follows:

Step 1: Regulatory Surplus

The power sector in Thailand is regulated by Energy Industry Act, B.E. 2550 (2007). The Energy Industry Act, 2007, does not restrict the choice of fuel for power generation. Moreover, it does not mandate electricity generation from wind projects, although it promotes the use of renewable sources of energy. In Thailand no laws, statutes, regulatory frameworks or policies implemented

since 11 November 2001 give comparative advantage to less emissions intensive technologies or activities relative to more emissions-intensive technologies or activities.

Step 2: Implementation of barrier:

The financial barrier is justified as per the step 2 of the Tool for the demonstration and assessment of additionality" v7.0.0. The same is explained below:

Step 2 of Additionality tool: Investment Analysis

As per para 29 of "Tool for the demonstration and assessment of additionality" v7.0.0, it is determined that the proposed project activity is not an economically attractive or financially feasible option.

To conduct the investment analysis, Methodological tool: Investment analysis, version 8.0, EB 97 Annex 8 has been referred.

Sub-step 2a: Determine appropriate analysis method

As per "Tool for the demonstration and assessment of additionality" (version 07.0.0), for financial analysis of the project, the following three options are available:

Option I: Simple Cost Analysis

Option II: Investment Comparison Analysis

Option III: Benchmark Analysis

The project will generate revenues from sale of electricity, therefore Option I is not applicable in line with para 32 of the Methodological tool: "Tool for the demonstration and assessment of additionality", version 7.0. Same applies to the Option II which is applied in case there are alternatives to the project activity as per para 42 of the "Tool for the demonstration and assessment of additionality", version 7.0.

Since, identified baseline for the proposed project activity is continuation of current practice (i.e. equivalent amount of energy would be generated by grid electricity system through its currently operating power plants and by new capacity addition) and which is outside the direct control of the project participant, hence benchmark analysis (option III), where the returns on investment in the project activity are compared to benchmark returns that are available to any investors in the country is selected as the most appropriate method.

Sub-step 2b: Option III. Apply benchmark analysis

As per Para 15 of Tool 27: Investment analysis, version 9 states that Required/expected returns on equity are appropriate benchmarks for equity IRR. The project participant has chosen benchmark analysis to demonstrate the additionality of the project. The project is promoted by limited company and hence the return on equity and the risks associated with the investments for their shareholder is of primary concern. Hence, in order to analyse the financial viability of the project activity, the prime financial indicator that has been used is the post-tax equity IRR of the project activity.

Selection of Appropriate Benchmark

The benchmark has been considered in accordance with Guidance 17 and 18 of Tool 57, version 9, "The values in the table in the Appendix may also be used, as a simple default option".

Methodology deployed for arriving at a suitable value of Benchmark using Default Value has been described below:

- As the proposed project activity generates power utilizing wind energy, Group 1 as per para 5a of Appendix of Tool 27, version 9 has been identified as a suitable category.
- The investment analysis has been carried out in Nominal terms. Accordingly, Default value as given in table under the Appendix, Tool 27 has been adjusted by adding suitable forecasted inflation rate taken from IMF world Economic database as no inflation forecast or inflation target published by Bank of Thailand (Central Bank of Thailand).
- Average forecasted inflation rate for the host country (Thailand) published by the IMF (International Monetary Fund World Economic Outlook- April 2016) for the next five years has been considered

The benchmark has been computed in the following manner:

Default Value Benchmark:

The cost of equity is determined by selecting the values provided in the table of the Appendix, i.e. Default values for cost of equity (expected return on equity) in the 'Methodological tool: Investment analysis'.

The Required return on equity (benchmark) was computed in the following manner:

Nominal Benchmark = $\{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$

Where:

Default value for Real Benchmark = 9.44% (as per Tool 27)

Inflation Rate forecast for by IMF.

Benchmark estimation:

The Cost of Equity has been considered using the "Methodological tool: Investment analysis" available at the time of decision making as well as the latest available value.

Table under Appendix in EB97, Annex 8 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in Thailand = **9.44%**

5 year inflation Forecast for Thailand as IMF World Economic Outlook available at the time of investment decision and corresponding benchmark values is 2.5%

Hence,

Nominal Benchmark = $\{(1 + 9.44\%) * (1 + 2.5\%)\} - 1 = 12.18\%$

Sub-step 2c: Calculation and comparison of financial indicators

The period considered for Post Tax Equity IRR calculations is 25 years, which corresponds to the operational lifetime of the project activity.

Depreciation, and other non-cash items related to the project activity, which have been deducted in estimating gross profits on which tax is calculated, is added back to net profits for the purpose of calculating the financial indicator.

Post Tax Equity IRR for the project activities against the benchmark values are shown in table below. Thus, it is evident that the project is not financially attractive as the equity IRR is less below the benchmark value.

Post tax Equity IRR	7.188%
Benchmark Value	12.18%

Sensitivity Analysis

The robustness of the conclusion drawn above, namely that the project is not financially attractive, has been tested by subjecting critical assumptions to reasonable variation. As required by Annex 08 of EB 97, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. PP has identified the total revenue from the project activity is dependent on the Tariff, Plant Load Factor, Project Cost and O&M Costs constitute more than 20% of the project costs. These factors have been subjected to a 10% variation on either side and the results of the sensitivity analysis indicate that even after applying such variation the EIRR does not cross the benchmark.

Factors	-10%	Normal	10%	% Variation to reach benchmark	Value required to reach benchmark
Tariff	5.14%	7.88%	10.55%	16.20%	5.130 BHT/kWh (peak) & 2.738 BHT/kWh (non-peak)
PLF	5.30%	7.88%	10.39%	17.22%	40.79%
Project Cost	10.04%	7.88%	6.12%	-18.00%	5478.28 Mn BHT
O&M Cost	8.47%	7.88%	7.27%	-80.00%	29.268 Mn BHT

The sensitivity analysis proves that varying the parameters does not lead to a Post Tax Equity IRR without carbon credits revenue, which will cross the benchmark value.

The carbon revenue from the project activity would provide significant amount of returns from the sale of the Emission Reductions accrued from the project activity and in turn increase the financial attractiveness of the project activity and hence make the project activity more financially viable.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4 – Common Practice Analysis

As per paragraph 10 of tool for “Common Practice” the project is a measure (b) where a switch of technology with a change of energy source. Therefore the steps outlined in Section 5 of the tool are outlined below, and the full spreadsheet with the Common Practice analysis is provided to the DOE:

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

The project output is electricity generated for the Thailand grid. In accordance with step 1 of section 5, the total design capacity is equal to 90 MW. Therefore +/-50% of the design capacity range is 45 MW - 135 MW.

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

- a) As the project is located in Thailand, therefore, the applicable geographical area is Thailand and projects in the host country Thailand have been chosen for analysis.
- b) The projects applying same measure (i.e, only renewable energy through wind) are selected as the proposed project activity is wind power project.
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 for the chosen projects (45 MW to 135 MW)
- f) The decision making date for is on 25th October 2016. As Kyoto Protocol was ratified by Thailand on 28/08/2002, therefore projects which had started commercial operation between 28/08/2002 to project's start date, have been identified.

Numbers of similar projects identified, which fulfil above-mentioned conditions are:

$$N_{\text{wind}} = 5$$

The list of projects is given below:

No	Project Name	Capacity
1	First Korat Wind Co.,Ltd	90 MW
2	K.R.TWO Co.,Ltd.	90 MW
3	KaoKhor Win Power Co.,Ltd.	60 MW
4	WaTaBak Win Co.,Ltd	60 MW
5	PattaPalunglom Co.,Ltd.	50 MW

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} .

CDM project activities, which have got registered, submitted for registration or are under validation have been excluded in this step. The list of the power plants identified is provided to the DOE.

No	Project Name	Capacity	CDM Registration No
1	First Korat Wind Co.,Ltd	90 MW	7650
2	K.R.TWO Co.,Ltd.	90 MW	7474
3	KaoKhor Win Power Co.,Ltd.	60 MW	5530
4	WaTaBak Win Co.,Ltd	60 MW	-
5	PattaPalunglom Co.,Ltd.	50 MW	-

After excluding the registered, submitted for registration and under validation projects the total number of projects,

$$N_{all} = 2$$

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} .

All the N_{all} wind power projects use the same wind technology. Hence,

$$N_{diff} = 0$$

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

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

$$F = 1 - (0/2) = 1$$

$$N_{all} - N_{diff} = 2 - 0 = 2$$

Outcome of Step 5:

As,

- i. $F = 1$; is greater than 0.2
- ii. $N_{all} - N_{diff} = 2$; is not more than 3

The project is “not a common practice” within a sector in the applicable geographical area.

As per paragraph 18 of the “Common practice tool”, v.03.1 “*The proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3*”. As the project activity does not satisfy the 2nd condition, as mentioned above, the project activity is not a “common practice” within a sector in the applicable geographical area.

Conclusion:

The assessment team is able to confirm that:

- The project analysis complies with requirements of the latest version of VVS.
- All the parameters and assumptions used in the investment analysis have been assessed thoroughly and found appropriate. The information with regard to how the input values was validated, cross-checked is included under relevant parameter.
- The sources used have been reviewed by the assessment team found to be authentic as referenced under relevant parameter.
- The benchmark was found suitable and has been thoroughly explained in detail.
- All the assumptions and calculations for investment analysis area have been checked by the financial expert and technical expert and found to be correct and reasonable.
- The financial returns from the project activity are insufficient to meet the required investment against the selected benchmark under reasonable variations (sensitivity) conducted on key parameters.
- The project activity complies with the latest version of “Tool for demonstration and assessment of additionality” and “Tool 27: Methodological Tool - Investment Analysis (version 08)”.

3.3.6 Quantification of GHG Emission Reductions and Removals

The project activity has applied baseline methodology as mentioned in the methodology ACM0002 version 19.0.0. As per the paragraph 42 of the methodology:

“Baseline emissions include only CO₂ emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants”.

The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid, CM, y} \dots\dots\dots(1)$$

Where:

BE_y = Baseline emissions in year y (t CO₂)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EG_{PJ,y} = EG_{PJ, facility, y}$ (for Greenfield projects paragraph 44 ACM0002)

$EF_{grid, CM, y}$ = 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” (tCO₂/MWh)

The Project proponent has adopted the combined margin approach for determination of the grid emission factor as per Thailand Grid Emission Factor for GHG Reduction Project/Activity’ dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation). The PP opted for combined margin emission factor ($EF_{grid, CM, y}$) for the project activity and it has been estimated ex-ante as 0.5692 tCO₂/MWh (National electricity grid in Thailand). It will remain fixed throughout the crediting period for the project activity as opted by PP. The combined margin emission factor is obtained from the three years generation weighed average of the operating margin emission factor and the latest year build margin emission factors by applying suitable weights (i.e. 75% to operating margin emission factor ($EF_{grid, OM, y}$) and 25% to build margin emission factor ($EF_{grid, BM, y}$) as referred to the EF tool version 7.0.

The weighted operating margin value of 0.5719 tCO₂/MWh and build margin value of 0.5609 tCO₂/MWh for Thailand electricity grid have been referred from Thailand Grid Emission Factor for GHG Reduction Project/Activity’ dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation)/16/. This is the latest available CO₂ baseline database at the time of the revised VCS PD submission for validation of the project activity. This is found to be appropriate and it is accepted.

Determination of $EG_{PJ,y}$ (Quantity of net electricity generation supplied by the project plant/unit to the grid in year y):

The PP has considered the value of $EG_{PJ,y}$ as 274,363 MWh/year for the project activity, which is an annualized average value calculated ex-ante based on the estimated generation available at the time of investment decision. Thus, the estimated annual average of emission reductions is arrived as 156,167 tCO₂e and total 1,561,670 tCO₂e over the 10 years of crediting period. The validation team confirms that the estimates of baseline emissions can be replicated using the information provided in the final Joint VCS PD& MR/1/. It can also be verified using the emission reduction calculation spread sheet/02/. Hence, it is concluded that the approach to calculate emission reductions is clearly demonstrated in the Joint VCS PD& MR/01/ is appropriate.

Estimation of Project Emissions (PE_y):

As per paragraph 34 of the applied methodology, for most renewable power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for, by using the following equation:

$$PE_y = PE_{EF,y} + PE_{GP,y} + PE_{HP,y}$$

Where,

PE_y = Project emissions in year y (tCO₂e)

$PE_{EF,y}$ = Project emissions from fossil fuel consumption in year y (tCO₂)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO₂e)

$PE_{HP,y}$ = Project emissions from reservoirs of hydro power plants in year y (tCO₂e)

As per para 37 of ACM0002 version 19,

“For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected”

The project activity is wind power project; hence the project emissions are not applicable to the project activity. Hence, $PE_y = 0$.

Estimation of Leakage Emissions (LE_y):

As per the paragraph 56 of ACM0002 version 19.0, No other leakage emissions are considered, thus leakage emissions are zero ($LE_y = 0$).

Estimation of GHG emission reductions:

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y,$$

Where

ER_y = Emission reductions in year y (tCO₂)

BE_y = Baseline Emissions in year y (tCO₂)

PE_y = Leakage emissions in year y (tCO₂)

$ER_y = 156,167 - 0 - 0$

$= 156,167 \text{ tCO}_2 \text{ per year}$

This is the annualized average value calculated for ex-ante representation purposes. The year-wise ER value has been demonstrated under the section 3.4 of the Joint VCS PD & MR, which is found to be acceptable.

Conclusion:

In line with the paragraph 113 of VVS for PAs version 02.0, validation team confirms that the project activity complies with the specified requirements of algorithms and/or formulae used to determine emission reductions and discussed above. The assessment team also confirms that:

- All assumptions and data used by the project participants are listed in the joint VCS PD&MR, including their references and sources;
- All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the joint VCS PD & MR;
- All values used in the joint VCS PD & MR are considered reasonable in the context of the project activity;
- The baseline methodology and corresponding tool(s) have been applied correctly to calculate project emissions, leakage emissions, baseline emissions and emission reductions;
- All estimates of the baseline emissions can be replicated using the data and parameter values provided in the joint VCS PD & MR.

3.3.7 Methodology Deviations

No methodology deviations identified.

3.3.8 Monitoring Plan

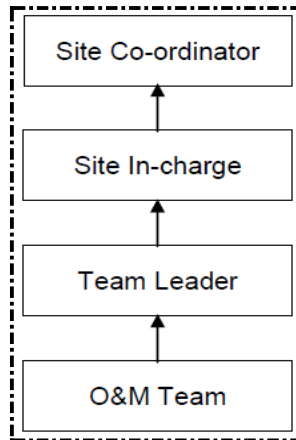
According to the applied methodology, ACM0002, version 19.0, the only parameter to be monitored is the “Quantity of net electricity generation supplied by the project plant/unit to the grid in year y”. This parameter is directly monitored through the dedicated metering system installed at the switch yard located at project site.

All the three wind projects in the bundle have entered into agreement with the respective WTG Suppliers for the operation and maintenance of WTGs. And the wind project has entered into agreement with the O&M contractor for the operation and maintenance of the project. O&M contractor will provide a monthly report, which includes generation data, major breakdown events

and machine availability. Project manager is responsible for recording of monthly meter readings of export and import. Monthly power export and import data will be sent regularly to site in charge of each project separately.

Monitoring roles and responsibilities:

The data for the project is compiled by the O&M Contractor and subsequently stored by the PP, the reporting and data flows as per the below mentioned flow chart starting from Site O&M team which monitors day to day operational data and monthly recording. The reporting responsibilities for the project are described as below;



The Site In-charge will be responsible for carrying out internal auditing and QA/QC. All the values from generation record will be checked with JMR and invoices for consistency. In case there are any non-conformances identified. The Site In-charge will investigate the error and revise the record to correct it. In any case where values have slightest of variation in different records the most conservative value will be taken in the project monitoring report.

Personal Training:

The training for operating and maintaining the plant will be provided to the O&M team whenever there would be necessity or any technological up gradation.

Emergency preparedness:

In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the Check meter will be used for readings

Data recording & archiving: The project proponent shall maintain data both in electronic form and hard copies. The monitored data shall be archived till 2 years after the completion of crediting period.

Monitoring Process at project site

Developer will monitor the quantity of electricity exported to the grid and imported to the project activity using the electricity meters installed in the wind power plant, which undertaken by EGAT.

Both electricity meters will measure the amount of electricity continuously and record electronically. The O&M operator also manually record amount of the electricity import and export meter to the grid from meters in the log book monthly. The monitoring reports will be checked and discussed periodically.

All monitored data will be stored for at least two years after the end of crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Oversight and accountability:

The possibility of oversight is unlikely as the energy meter readings are recorded jointly by PP and EGAT which is the basis for the electricity billings. Also a backup meter is available to crosscheck any considerable difference in the energy reading.

Internal auditing and QA/QC

No requirement of internal audit for the data monitored as the data is measured by the energy meter installed by EGAT (government authority) and the reading is recorded every month by jointly by PP & representative from EGAT. The main energy meter readings are verified against the reading of the backup meter to check any considerable variation. In case, considerable variation found, then either main meter reading or check meter reading whichever lower will be considered. The electricity readings recorded are used for electricity invoicing to EGAT. Hence, the data collected is of high accuracy and authorised by EGAT.

Handling Non-conformities

Not applicable as the energy meter recording is done by EGAT and hence no internal audit will be carried out to verify the data.

Sampling approaches:

No sampling approach is used as all the monitoring parameter is monitored 100%.

Monitoring Equipment Details: Energy Meter

Details	Line-1
Meter Number	Main:151515191 backup: 151515192
Accuracy	0.2s
Location	Si Kheu 3 Substation (EGAT)
Calibration dates	23/02/2018 22/02/2019
Calibration due date	23/02/2019 22/02/2020
Calibration frequency	1 year

Conclusion:

The monitoring methodology applies consistently the choice of the option selected for monitoring of baseline emissions. The monitoring plan provide procedures for the collection and archiving of all relevant data necessary for estimation or measuring the emission reductions within the project boundary during the crediting period.

The project participant has the ability to implement the monitoring plan. This is checked through discussion with consultant, the project participant and O&M contractors of the project activity

during the physical site inspection. The staffs at the sub-station and the representative of the technology providers were also interviewed to verify the accuracy in the documents. This has been checked during the site visit and is found to be acceptable.

The final joint VCS PD & MR /01/ has been reviewed to check that the procedure for data uncertainty, emergency preparedness, roles and responsibility, operational and management structure are mention in the PD. The monitoring plan completely describes all measures to be implemented for monitoring all parameters required. Based on the above discussion and the requirements of paragraphs 117 and 119 of the VVS for PAs version 02.0/10/, the validation team confirm that:

1. The monitoring plan included in the joint VCS PD & MR is based on the baseline methodology ACM0002 version 19.0.0 which has been applied to the VCS project activity.
2. The monitoring arrangements described in the monitoring plan are feasible within the project design.
3. The PP has the ability to implement the monitoring plan as per the joint VCS PD & MR.

3.4 Non-Permanence Risk Analysis

The project activity does not require a non-permanence risk analysis. Hence this is not applicable.

4 SAFEGUARDS

4.1 No Net Harm

There is no negative impact to any socio economic conditions of the region due to the project activity. This project activity will not involve any negative environmental or socio-economic impacts, as the project activity involves generation of power using wind power which is a clean source of energy. Hence no mitigation measures are required.

4.2 Environmental Impact

The project proponent has mentioned in the Joint VCS PD & MR/01/ that the present project activity does not require EIA to be carried out, according to the announcement by Ministry of Natural resource and Environment dated 16 June 2009, the EIA report is required only for the thermal based electricity generation projects whose capacity is more than 10 MW. Since the project is a wind power project, it is not required to conduct EIA for this project. The project activity does not fall under the listed categories and hence not required an EIA to be done. Thus the adequacy of the analysis carried out by the project participant for the impact of the implementation of the project activity on the environment has been validated as per paragraphs 126 and 129 of VVS for PAs version 02.0.

The validation team is of the opinion that the project complies with environmental regulations in Thailand.

4.3 Local Stakeholder Consultation

The local stakeholder consultation process has been described in detail, by the PP, in section 5.3 of the joint VCS PD & MR the project participant identified the relevant stakeholders such as local villagers, local employee, representatives of affected people residing in the project area and local village head etc.

Local stakeholder consultation process has been performed during the design phase through inviting the relevant stakeholders to comment on the project activity. The Local Stakeholder Meeting was held on 02/09/2019 at the project site in Nongwang, Bueng Prue and Samnaktakhro sub-districts of Thepharak District, Nakhonratchasima Province in Thailand.

Stakeholders were invited through public notice at least a week in advance. The documentary evidence provided as proof of date of the invitation, meeting; and mode of invitation/9/ has been checked by the assessment team during the site visit and found to be appropriate.

After sharing information with the local stakeholders about the company and the purpose of proposed activity, the stakeholders were briefed about non-conventional energy sources and their importance. The PP also informed the stakeholders about their intention of securing carbon credit benefits for the project activity for financial sustainability of the project. The Minutes of the meeting of the stakeholder meeting and attendance sheet/9/ have been submitted by the PP.

During the site visit the assessment team interviewed some of the local villagers. Based on the replies of the villagers, the validation team was convinced that the process of stakeholder consultation was carried out as described in the joint VCS PD & MR. The villagers also confirmed that they were invited for the meeting through public notice. This was found to be consistent with the invitation process mentioned in the joint VCS PD & MR /01/.

Overall, there was an understanding among the stakeholders that the project activity would lead to the overall development of the area, mainly by generating employment opportunities and improving the infrastructure leading to an improved life for the villagers. The local stakeholders interviewed during the site visit endorsed this view.

4.4 Public Comments

In accordance with the requirement in clause 3.17.5 of the VCS standard version 3.7 “All VCS projects are subject to a 30-day public comment period. The date on which the project is listed on the project pipeline marks the beginning of the project’s 30-day public comment period”.

The PP listed their project activity in the VCS pipeline for 30 days from 15/11/2019 to 15/12/2019 (https://www.vcsprojectdatabase.org/-/pipeline_details/PL2002) for public comments.

No comments received during the commenting period, as evident from the VCS pipeline in the web interface.

5 VERIFICATION FINDINGS

5.1 Accuracy of GHG Emission Reduction and Removal Calculations

The calculation of the emission reductions is found to be correct. The details of the reported and the verified values for all parameters are listed in section 5.2 of this report.

The parameter “Quantity of net electricity generation supplied by the project to the grid in year y” by each sub-project is directly sourced from meter reading report and invoice issued by relevant grid authority. The PP has provided the complete set of data for all the monitored parameters in the ER spreadsheet/02/. This data has been verified as described in section 5.2 below. The formulae & method used to calculate the baseline emissions, project emissions and leakage are appropriate and in line with the approved methodology ACM0002 version 19.0/4/.

The PP has calculated the grid emission factor as per the combined margin approach described in the ‘Tool to calculate the emission factor for an electricity system’, version 07.0/5/. The grid emission factor has been calculated as the weighted average of OM & BM; and has been fixed ex-ante for the entire crediting period.

The OM and BM have been obtained from a publicly available source i.e. “Thailand Grid Emission Factor for GHG Reduction Project/Activity’ dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation)/16/. The combined margin emission factor was arrived at by applying weights of 75% for OM and 25% for BM, as specified in the tool. The OM and BM have been calculated to be 0.5719 tCO₂/MWh and 0.5609 tCO₂/MWh respectively. Applying the weights, the grid emission factor has been calculated to be 0.5692 tCO₂/MWh.

As per ER excel spreadsheet/02/ submitted by the PP, the net emission reduction for the current monitoring period has been estimated to 136,087 tCO₂e which was against the quantity of net power supplied to the grid during the monitoring period 27/11/2018 to 31/10/2019, which was 239,086.2 MWh.

The assessment team is able to confirm that the GHG emission reductions and removals have been quantified correctly in accordance with the project description and applied methodology. Hence, the total quantity of emission reductions claimed for the current monitoring period, i.e. 136,087 tCO₂e, has been verified.

5.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

All the data recorded is in compliance with the VCS joint PD & Monitoring Report/1/.The assessment team has checked the monthly electricity generated and supplied by project activity/20/ in the current monitoring period to verify the values of monitoring parameter reported in ER calculation sheet and found to be consistent. Since the monthly statement prepared and issued by state utility, they are found to be reliable and authentic.

As per the validated joint VCS PD & MR /01/, the operations, maintenance and monitoring of the project activity is being carried out by an in-house O&M team at project site, consist of trained technical professionals. Also, regular training sessions are imparted to the team for ensuring efficient monitoring and operation of the project. Hence it is confirmed that the management system of the VCS project is in place; with the responsibilities properly identified. The same was also verified during the on-site verification.

The monitoring of the project activity is found to be in accordance with the monitoring methodology described in ACM0002, Version 19.0.0/4/. The monitoring mechanism is effective and reliable. During the site visit, personnel involved at various levels of the operation of the project activity have been interviewed to confirm that the plant personnel are conscious of the importance of the monitoring activities. The on-site verification of the plant records also substantiate consistency in recording and reporting of monitored data.

The required monitoring systems have been installed and are operational. The meters comply with appropriate quality standards applicable for the used technology. The accuracy class of the meters installed for the project activity was verified against the validated VCS joint PD & MR /01/ and cross-checked against the Power Purchase Agreements /08/ signed for the project activity.

The supporting records of power generation/20/ were checked and found to be in line with the calculation provided by PP in the ER sheet and MR section.

The following parameter has been verified for current monitoring period:

Quantity of net electricity generation supplied by the project plant/unit to the grid in year y, $EG_{PJ,y}$ (MWh):

Means of verification		
	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	The parameter is monitored continuously and recorded on monthly basis.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the joint VCS PD & MR/01/ and monitoring methodology/04/.
	Monitoring equipment	The two parameters, import and export to the grid, are measured at the same location near the connection to the grid, through standard electricity metering instrument. The metering instruments are installed at the grid-connected point to measure the amount of electricity going from and to the grid. The readings of electricity will be continuously measured by metering instrument itself and monthly recorded. The energy meter details are reported under section 4.3 of the joint VCS PD & MR/01/ which are verified by assessment team and same is included under a table under the section 3.3.8 above.
	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the	The accuracy of the monitoring equipment used is 0.2s as verified from the physical inspection of the project activity, which is as per the joint VCS PD & MR/01/ which is as per the norm defined in the PPA/08/.

	accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The new meters are installed at the time of commissioning of the project which are pre-calibrated meters from the manufacturer. Hence at present no external calibration or testing is required
	Calibration frequency /interval:	Calibration frequency of the meters is once in years/01/.
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes. The calibration frequency is in line with the monitoring plan as outlined in the joint VCS PD & MR/01/. The new meters are installed at the time of commissioning of the project which are pre-calibrated meters. Hence, the due date of calibration will be after 1 year.
	Is the calibration of measuring equipment carried out by an accredited person or institution?	The new meters are installed at the time of commissioning of the project which are pre-calibrated meters from the manufacturer. Hence at present no external calibration or testing is required.
	Is(are) calibration(s) valid for the whole reporting period?	Yes, the calibrations of meters are valid for the whole monitoring period.
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	The new meters are installed at the time of commissioning of the project which are pre-calibrated meters from the manufacturer. Hence at present no external calibration or testing is required.
	How were the values in the monitoring report verified?	In line with the monitoring parameter, the cumulative value of $EG_{PJ,y}$ for entire monitoring period is to be reported in the monitoring report,

		whereas monthly values are to be reported in the ER calculation sheet. The assessment team has verified the values from the monthly generation report and invoice and also checked the ER calculation in line with the prescribed formulae and procedure.
	If applicable, has the reported data been cross-checked with other available data?	Yes. The assessment team has cross checked the quantity of net electricity supplied to the grid both from the monthly generation report and invoice raised by the project participant to the third party.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the adequate QA/QC procedures were implemented in the project. The energy meters at the feeders are maintained and owned by EGAT. Neither the project proponent nor the site personnel have any control over it. The meters are calibrated by the monthly generation report and invoice at-least once in year.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
Findings	CAR #5, was raised and resolved	
Conclusion	The parameter has been monitored appropriately, in accordance with the monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. From the physical verification, documentary evidence the assessment team has concluded that the monitoring plan is adequately implemented and also the all required records and documentations are maintained, hence results are achievable.	

Parameters fixed ex ante:

$EF_{grid,OM,y}$; tCO_2e/MWh : it is the operating margin emission factor of Thailand national grid fixed for the entire crediting period and the value is considered as 0.5719 tCO_2e/MWh , that is consistent with the joint VCS PD & MR/01/.

$EF_{grid,BM,y}$; tCO_2e/MWh : it is build margin emission factor of Thailand national grid fixed for the entire crediting period and the value is considered as 0.5609 tCO_2e/MWh , that is consistent with the joint VCS PD & MR/01/.

$EF_{grid,CM,y}$; tCO₂e/MWh: it is the combined margin emission factor of Thailand national grid fixed for the entire crediting period and the value is considered as 0.5692 tCO₂e/MWh, that is consistent with the joint VCS PD & MR/01/.

The details of monitoring equipment are involved in the project activity and their calibration details/25/ are mentioned in the table under section 4.3 of the joint VCS PD & MR/01/. There details of energy meters are provided in the VCS document, and assessment team has verified the information during the site visit that all the meters were tested and calibrated at the time of installation and currently calibration is not due; hence accepted.

While the meters have been physically inspected during the site visit, the meter details are found to be consistent with that observed during the site visit.

In view of the above discussion the assessment team able to confirm that evidence used to determine the GHG reductions and removals are sufficient and appropriate with respect to quality and quantity.

GHG Calculations

The emission reduction as per the applied methodology equals the baseline emissions (project emissions is considered zero). The formula provided for the calculation of baseline emissions is:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

BE_y : Baseline emissions in year y (tCO₂e/yr)

$EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (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" (tCO₂/MWh) (i.e., 0.5692 tCO₂e/MWh).

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

$$BE_y = 239,086.2 \text{ MWh} * 0.5692 \text{ tCO}_2\text{e/MWh} = 136,087 \text{ tCO}_2\text{e}$$

As per the applied methodology, the project emission is nil. Hence, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

$$ER_y = 136,087 \text{ tCO}_2\text{e}$$

The verification team confirms that appropriate methods and formulae for calculating baseline emissions have been followed. The assumptions, emission factors and default values that were applied in the calculations are justified. However, due to infirm power generation during the current monitoring period, the actual emission reduction achieved is considered as zero, which is a conservative approach. Hence the assessment team has concluded the justification in emission reduction calculation as justified and acceptable. The means of verification for the different parameters used for baseline emission calculation formulae are described above.

6 VALIDATION AND VERIFICATION CONCLUSION

M/s. Kosher Climate India (P) Limited has contracted the Earthood Services Private Limited (also referred to as ESPL) to validate and verify the project: “Theparak Wind in Thailand” with regard to VCS Version 3 requirements and the information provided by the project proponent related to the project design, operation, monitoring and reporting. The monitoring period considered for current verification is from 27/11/2018 to 31/10/2019 in the VCS joint project description & Monitoring Report Version 02.1 dated 16/12/2019 are eligible for registration and issuance.

A risk-based approach has been followed to perform this validation and verification. In the course of the joint validation & verification 07 Corrective Action Requests (CARs), 02 Clarification requests (CLs) were raised and successfully closed.

No limitations or doubts were identified related to the validation and verification.

Validation conclusion:

ESPL has reviewed the project description documents and subsequently carried out site visit interviews to confirm the fulfilment of stated criteria.

The purpose of this project activity is to generate electricity using renewable sources (Wind) and export it to Thailand national grid and sold to the EGAT, thereby marginally contributing to reducing the energy demand supply gap in Thailand.

The project activity has applied the baseline and monitoring methodology, ACM0002: Grid-connected electricity generation from renewable sources, Version 19.0.0, which is an approved methodology under the CDM programme and is acceptable under VCS Version 3. The baseline has been determined in accordance with the stated approved baseline methodology.

As summary the validation team able to conclude that:

- The project is in line with all relevant host country criteria (Thailand) and all relevant VCS version 3 program guidelines requirements.
- The project additionality is sufficiently justified in the joint VCS PD & MR.
- The monitoring plan is transparent and adequate and in line with applied baseline and monitoring methodology of ACM0002, version 19.0.
- The calculation formulae and use of parameter for the project emission reductions estimation are transparent and in line with the requirement of the applied methodology. The ex-ante projection of emission reductions given is found to be appropriate, conservative and in line with the requirement. The ex-ante projected volume of 156,167 tCO₂e/year and a total of 1,561,670 tCO₂e is most likely to be achieved during the 10 years (renewable) of crediting period. The calculated emission reduction for the current monitoring period (i.e. 27/11/2018 to 31/10/2019) is 136,087 tCO₂e, which is correct, in

line with the calculation prescribed in the VCS PD & MR, hence considered to be verified ERs.

- The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation as outlined under VCS version 3.

Verification conclusion:

This engagement covers the verification of emission reductions from anthropogenic sources of greenhouse gases included within the project boundary of the project “Theparak Wind in Thailand” (Project pipeline VCS ID-2002), as well as an additional confirmation of the compliance of the joint VCS PD & MR with the requirements of VCS Standard version 3.7.

ESPL is an entity accredited by the United Nations Framework Convention on Climate Change (UNFCCC) to undertake certification and verification services in the sectoral scope in which the Project is undertaken.

The VCS joint project description & Monitoring Report, together with other information examined, was prepared as per the VCS joint project description & Monitoring Report Template, Version 3.1.

The information in the VCS joint project description & Monitoring Report together with other information examined by the assessment team, including all the information necessary to determine that the emission reductions achieved have been determined correctly.

In view of the information provided in the VCS joint project description & Monitoring Report and other relevant information, it can be concluded that the project meets all the requirements of the VCS Standard Version 3.7/18/. Also on the basis of our examination of the VCS joint project description & Monitoring Report and other relevant information, it has been concluded that the emission reductions during the current monitoring period (i.e. 27/11/2018 to 31/10/2019 (both the days included)) are verified as 136,087 tCO₂e.

The team of Kosher Climate India (P) Ltd. (i.e. authorized representative of PP) is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions. ESPL is responsible for verification and confirming emission estimates for the project, as described in the VCS joint project description & Monitoring Report.

The certification approach followed by ESPL draws on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. Our examination includes an assessment of evidence, through desk review, and where necessary, interviews, stakeholder discussions and site visits, relevant to certifying the rightfulness of the amounts and disclosures in relation to the Project’s GHG emission reductions.

We planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that the amount of GHG emission reductions for the given period, prepared on the basis of the VCS Joint project description & Monitoring Report, are fairly stated.

Based on process and procedures conducted, in our opinion, Theparak Wind Power Co., Ltd. (i.e. PP) assertion on GHG emission reductions for the “Theparak Wind in Thailand” (i.e. VCS project pipeline ID-2002) project during the reporting period “27/11/2018 to 31/10/2019 ” is materially correct and is a fair representation of the GHG data and information and the emission reductions are fairly stated. The GHG emission reductions were calculated correctly on the basis of approved monitoring methodology ACM0002 version 19.0. The verification team also confirms

that the project is implemented as described in the validated VCS joint PD & MR (final version 03).

Therefore, ESPL is able to certify that the project is in full compliance with the VCS Standard Version 3.7, and the quantity of the reported emission reductions during below reporting period are completely, comparably, accurately and correctly reported.

Verification period: From [27th – Nov - 2018] to [31st – Oct – 2019]

The verified GHG emission reductions and removals in the above verification period (both the dates inclusive) are presented as follows:

Year / Period	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)
2018 (27 th Nov to 31 st Dec 2018)	5,058	0	0	5,058
2019 (1 st Jan to 31 st Oct 2019)	131,029	0	0	131,029
Total	136,087	0	0	136,087

Comparison of Estimated ER and actual:

Description	Value	Unit
Estimated emission Reduction as per PDD	156,167	tCO ₂ e/year
Total days in the Monitoring period	339	days
Estimated ERs for this monitoring period	145,043	tCO ₂ e
Actual Emission Reduction	136,087	tCO ₂ e
Difference in Emission reduction	-6.17%	

The actual emission reduction is 6.17% is less than the estimated emission reduction.

Approved by



Dr. Kaviraj Singh
Managing Director
Earthood Services Privated Limited

Date: 17/12/2019
Place: Gurgaon, Haryana

APPENDIX 1: Document Reference

Ref. No	Title of Document	Version	Date
1	Joint Project Description & Monitoring Report	1.2	17/11/2019
		2.1	16/12/2019
2	Emission Reductions Calculation Spread sheet (Validation and verification)	1.2	17/11/2019
		2.1	16/12/2019
3	Combined IRR and Benchmark Analysis Spread sheet	1.2	17/11/2019
4	ACM0002, "Grid-connected electricity generation from renewable sources"	19.0	-
5	Tool to calculate the emission factor for an electricity system	07.0	EB 100 Annex 4
6	VCS pipeline https://www.vcsprojectdatabase.org/pipeline_details/PL2002	-	-
7	Commissioning Certificates of the project activity	-	27/11/2018
8	Power purchase agreement (PPAs)	-	12/05/2014
9	Local stakeholder documents – - Public notice - Minutes of meeting - Attendance sheet - Comments sheet	-	02/09/2019
10	Clean Development Mechanism Validation and Verification Standard	02.0	29/11/2018
11	Tool for the demonstration and assessment of additionality	07.0.0	EB 70, Annex 8
12	Technical specifications of the project	-	-
13	Ministry of Natural resource and Environment announcement on EIA		16/06/2009
14	Purchase order General electric international Inc.		31/12/2016
15	Approvals and Clearances for project activity	-	-
16	Thailand Grid Emission Factor for GHG Reduction Project/Activity' dated 28/09/2017 Published by Thailand Greenhouse Gas Management Organisation (Public Organisation) http://ghgreduction.tgo.or.th/images/Grid_Emission_Factor_2559_Finalised.pdf		28/09/2017
17	Guidelines on the assessment of the investment analysis	EB 62, Annex 05	-
	Investment Analysis tool, EB 101, Annex 11	09.0	-
18	VCS Standard	Version 3.7	21/06/2017
	VCS Program Guide	Version 3.7	21/06/2017
19	Letter of undertaking/declarations from PP regarding not having created or sought any other form of environmental credits and other GHG programs for the project	-	
20	Monthly Generation records for the project activity issued for the current monitoring period (reference to 'infirm power' during the current monitoring period)	-	27/11/2018 to 31/10/2019

21	Monthly Invoices		27/11/2018 to 31/10/2019
22	Site visit attendance sheet, photographs	-	11/12/2019
23	VCS Listing Representation	-	08/11/2019
24	Communication Agreement for VCS representation	-	08/11/2019
25	Calibration certificate		27/11/2018 to 31/10/2019

APPENDIX 2: Abbreviations

ABT	Availability Based Tariff
ACM	Approved Consolidated Methodology
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
DISCOM	Distribution company
DPR	Detailed Project Report
EB	Executive Board
EIA	Environmental Impact Assessment
EPC	Engineering and Procurement Contractor
EGAT	Electricity Generating Authority of Thailand
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse Gases
ISO	International Organization for Standardization
JMR	Joint Meter Readings
LCS	Local Controller System
MGRs	Monthly Generation Reports
MoEF	Ministry of Environment and Forest
MP	Monitoring Period
MR	Monitoring Report
MW	Mega Watt
MWh	MegaWatt hour
OM	Operating Margin
O&M	Operation & Maintenance
PD	Project Description
PP	Project proponent
PPA	Power Purchase Agreement
QA/QC	Quality Assurance/Quality Control
REC	Renewable Energy Certificates
tCO ₂	Tonnes of Carbon Dioxide
UNFCCC	United Nations Framework Convention on Climate Change

VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit

APPENDIX 3: Competency Statement

APPENDIX C: Competency Statement

Competence Statement			
Name	Vivek Kumar Ahirwar		
Country	India		
Education	B.E. (Mechanical Engineering) M.Tech (Energy Management)		
Experience	10 Years +		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	ACM0002, AMS.I.D		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert	YES (1.1, 1.2, 13.1)		
Reviewed by	Shreya Garg	Date	11/09/2018
Approved by	Anshika Gupta	Date	11/09/2018

Competence Statement	
Name	Anshika Gupta
Country	India
Education	M.Sc. (Climate Science & Policy), TERI University
Experience	4 Years +
Field	Climate Change
Approved Roles	
Team Leader	YES
Validator	YES
Verifier	YES
Methodology Expert	AMS-I.A., AMS-II.G., ACM0002, AMS-III.A.V.
Local expert	YES (India)
Financial Expert	NO
Technical Reviewer	YES
TA Expert	Yes (TA 1.2, TA 3.1)

Reviewed by	Shreya Garg	Date	12/03/2019
Approved by	Kaviraj Singh	Date	12/03/2019

APPENDIX 4: Findings Overview

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

FAR ID		Section no.	NA	Date :DD/MM/YYYY
Description of FAR				
N/A				
Project participant response				Date :DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY

Table 2. CL from this validation

CL ID	1	Section no.	PD	Date :30/11/2019
Description of CL				
PP is requested to submit following documents:				
- Technical specification of wind turbine from supplier - Undertaking documents as per section 1.12.2, 1.12.4 and 1.12.5 - Ministry of Natural resource and Environment announcement on EIA dated 16 June 2009 - Stakeholder consultation documents - License to operate the SPP with EGAT - Factory license (rorngor 4) - Certificate of Building Construction - Energy Industry Operation, Controlled Energy Production, Electricity Industry Operation License - Certificate of Electricity Quality				
Project participant response				Date :06/12/2019
<i>All the documents mentioned above are submitted to DOE for verification.</i>				
Documentation provided by project participant				
- <i>Technical specification of wind turbine from supplier</i> - <i>Undertaking documents as per section 1.12.2, 1.12.4 and 1.12.5</i> - <i>Ministry of Natural resource and Environment announcement on EIA dated 16 June 2009</i> - <i>Stakeholder consultation documents</i> - <i>License to operate the SPP with EGAT</i> - <i>Factory license (rorngor 4)</i> - <i>Certificate of Building Construction</i> - <i>Energy Industry Operation, Controlled Energy Production, Electricity Industry Operation License</i> - <i>Certificate of Electricity Quality</i>				
DOE assessment				Date: 10/12/2019
Assessment team confirm that submitted documents are inline with requirements and acceptable.				
CL#1 Closed				

CL ID	2	Section no.	PD	Date :30/11/2019
Description of CL				

PP is requested to clarify how grid emission factor taken from Thailand Greenhouse Gas Management Organisation (Public Organisation) is inline with CDM tool to calculate the emission factor for an electricity system.	
Project participant response	Date : 06/12/2019
The Thailand Greenhouse Gas Management Organisation (Public Organisation) has estimated the grid emission factor of Thailand as per the Tool to calculate the emission factor for an electricity system. The step wise calculation is explained the document http://ghgreduction.tgo.or.th/images/Grid_Emission_Factor_2559_-_Finalised.pdf . The revised PD also now includes stepwise calculation in line with Tool to calculate the emission factor for an electricity system.	
Documentation provided by project participant	
Revised PD	
DOE assessment	Date: 10/12/2019
Assessment team confirm that The Thailand Greenhouse Gas Management Organization grid emission factor calculation for Thailand is based on Tool to calculate the emission factor for an electricity. In Revised PD, PP has included stepwise calculation. Hence Accepted	
CL#2 Closed.	

Table 3.CAR from this validation

CAR ID	01	Section no.	PD	Date :30/11/2019
Description of CAR				
In Section 1.7 PP needs to include detail how project activity is small scale project activity.				
Project participant response				Date : 06/12/2019
The project annual emission reduction is estimated to be 156,167 tCO ₂ which is less than 300,000 tonnes of CO ₂ e per year. As per the Section 3.9.1 of Project standard the projects falls under the category of 'Projects'. The same is included in the Section 1.7 of the PD.				
Documentation provided by project participant				
Revised PD				
DOE assessment				Date: 10/12/2019
Assessment team confirm that PP has included details in section 1.7 of the PD how project is small scale project activity. Hence accepted.				
CAR#1 Closed				

CAR ID	02	Section no.	PD	Date :30/11/2019
Description of CAR				
PP is requested to mention applicability condition of TOOL to calculate grid emission factor instead of "In addition, the above applicability conditions the applicability conditions of tool referred in the methodology ACM0002, version 19.0 has been referred here under"				
Project participant response				Date : 06/12/2019
Necessary corrections are made in the section 2.2. Now the tool to calculation emission factor of an electricity system is now referred.				
Documentation provided by project participant				
Revised PD.				
DOE assessment				Date: 10/12/2019
Assessment team confirm that changes done by PP is acceptable and inline with requirement.				
CAR#2 Closed				

CAR ID	03	Section no.	PD	Date :30/11/2019
Description of CAR				
PP is requested to include final conclusion of additionality in section 2.5 and how Chronology of VCS events define additionality.				
Project participant response				Date : 06/12/2019
<i>Description on how the chronology events define additionality and the final conclusion of additionality are now included in section 2.5 of the PD.</i>				
Documentation provided by project participant				
<i>Revised PD</i>				
DOE assessment				Date: 10/12/2019
Assessment team confirm that changes done by PP is acceptable and inline with requirement.				
CAR#3 Closed				

CAR ID	04	Section no.	PD	Date :30/11/2019
Description of CAR				
PP is requested to include calibration due date of main meter and backup meter.				
PP is requested to include calibration frequency of energy meters.				
Project participant response				Date : 06/12/2019
<i>The calibration due date of main meter & check meter are included now.</i>				
<i>The calibration frequency of energy meter is included in the PD.</i>				
Documentation provided by project participant				
DOE assessment				Date: 10/12/2019
Assessment team confirm that PP has included calibration due date of main meter and check meter with calibration frequency of energy meter. Hence Accepted				
CAR#4 Closed				

CAR ID	05	Section no.	PD	Date :30/11/2019
Description of CAR				
In Section 5.4 PP also needs to include VCS Pipeline commenting period details and comment received from VCS portal.				
Project participant response				Date : 16/12/2019
<i>No comment received during commenting period hence joint VCS PD and MR updated accordingly.</i>				
Documentation provided by project participant				
DOE assessment				Date: 17/12/2019
Assessment team confirm that no comment received during commenting period. Hence CAR #5 Closed.				

CAR ID	06	Section no.	PD	Date :30/11/2019
Description of CAR				

As per VCS template version 3.1 requirement PP needs to include following information in section 4.3:

- The policies used for oversight and accountability of monitoring activities.
- The procedures used for internal auditing and QA/QC.
- The procedures used for handling any internal auditing performed and any non-conformances identified.
- The implementation of sampling approaches, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures. *Where applicable, demonstrate whether the required confidence level or precision has been met.*

Project participant response

Date : 06/12/2019

The above details are included in the section 4.3 of the PD.

Documentation provided by project participant

Revised PD.

DOE assessment

Date: 10/12/2019

Assessment team confirm that PP has updated section 4.3 inline with standard template requirement. Hence accepted

CAR#6 Closed

CAR ID	07	Section no.	PD	Date :30/11/2019
Description of CAR				
PP is requested to include details of emission reduction in current monitoring and ex-ante emission reduction. Percentage deviation of emission reduction in current monitoring period from ex-ante and reason of deviation.				
Project participant response				Date : 06/12/2019
The comparison of emission reduction in current monitoring and ex-ante emission reduction are included in the PD. Also Percentage deviation of emission reduction in current monitoring period from ex-ante and reason of deviation are included in the revised PD.				
Documentation provided by project participant				
Revised PD.				
DOE assessment				Date: 10/12/2019
Assessment team confirm that PP has included details of emission reduction in current monitoring and ex-ante emission reduction. Percentage deviation of emission reduction in current monitoring period from ex-ante and reason of deviation in revised PD. Hence Accepted.				
CAR#7 Closed				

Table 4. FAR from this validation

FAR from this validation				
FAR ID		Section No.	PD	Date : DD/MM/YYYY
Description of FAR				
NA				
Project participant response				Date :DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				