NINGXIA XIANGSHAN WIND FARM PROJECT

Document Prepared By (Denny Xue- Lead Auditor/ Technical Expert)

LGAI Technological Center S.A.

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Summary:

Validation purpose: The main purpose of this project activity is to generate clean form of electricity through renewable wind energy sources. The project activity involves total capacity of 397.5 MW wind power project which is installed in Zhongwei City, Ningxia Hui Autonomous Region, People's Republic of China. The wind project has been developed by Ningxia Zhongwei Aluminum New Energy Co., Ltd.

During the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 727,982 tCO_2e per year, thereon displacing 948,633.80 MWh amount of electricity from the generation-mix of power plants connected to the Chinese power grid annually, which is mainly dominated by thermal/fossil fuel-based power plant.

The objective of this validation activity is to have an independent third party for the assessment of the project design, estimated ER sheet and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against "ACM0002 version 19.0"
- the project's monitoring plan is assessed against "ACM0002 version 19.0"
- the projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM Validation and Verification Standard for project activities version 02
- CDM Project Standard for project activities version 02
- CDM project cycle procedure for project activities version 02
- VCS standard v3.7[1]
- VCS guideline v3.7

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

A risk-based approach has been followed to perform this validation and verification activity. In the course of Validation, 02 Corrective Action requests (CARs) and 00 Clarification Requests (CLs) & 00 Forward action request (FARs) were raised and successfully closed. The review of the project description and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and project owners have provided LGAI Technological Center S.A. (Applus+ Certification) with sufficient evidence to verify the fulfilment of the stated criteria of VCS.

Verification purpose:

The proposed project activity will assist development of renewable energy generation plants based on wind energy technology in India and delivering electricity to the grid.

[1] http://www.v-c-s.org/project/vcs-program/rules-and-requirements/

The proposed project is a voluntary action being undertaken by the project owner of the project activity. Beijing Cronus Technology Consultancy Centre is acting as the other party for this project activity.

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy sources. The project activity involves total capacity of 397.5 MW wind power projects which are installed in Zhongwei City, Ningxia Hui Autonomous Region, People's Republic of China. The wind project has been developed by the Ningxia Zhongwei Aluminum New Energy Co., Ltd.

During the Current Monitoring Period from 15/04/2017 to 28/02/2019 (First and last date included) the project activity has supplied 2,001,008.63 MWh of electricity, and thus contributing to the GHG reductions 1,535,574 tCO_2e. Assessment team confirm that Project crediting period for project activity is taken as 10 years renewable twice. Accordingly, the start date of the first crediting period is 15/04/2017 and end date will be 14/04/2027. First crediting period is from 15/04/2017 to 14/04/2027.

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

During the current monitoring period, project activity undergoes continued operation since their commissioning and no major breakdown had taken place.

The objective of this verification activity is to have an independent third party for the assessment of the project design, Actual ER sheet and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against "ACM0002 version 19.0"
- the project's monitoring plan is assessed against "ACM0002 version 19.0"
- the projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM Validation and Verification Standard for project activities version 02
- CDM Project Standard for project activities version 02
- CDM project cycle procedure for project activities version 02
- VCS standard v3.7[2]
- VCS guideline v3.7

A risk-based approach has been followed to perform this verification activity. In the course of verification, 00 Corrective Action requests (CARs) and 00 Clarification Requests (CLs) were raised & successfully closed and 00 Forward action request (FARs) is raised. The review of the Monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and project owners have provided LGAI Technological Center S.A. (Applus+ Certification) with sufficient evidence to verify the fulfillment of the stated criteria of VCS.

[2] http://www.v-c-s.org/project/vcs-program/rules-and-requirements/

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center S.A. (Hereinafter referred as Applus+ Certification) has been appointed by "**Beijing Ruifang Information Technology Co., Ltd**" to perform the validation and verification of the project entitled "Ningxia Xiangshan Wind Farm Project" under VCS standard and guideline version 3.7. The objective of this Joint validation & verification activity is to have an independent third party for the assessment of the project design, ER sheet and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against "ACM0002 version 19.0"
- the project's monitoring plan is assessed against "ACM0002 version 19.0"
- the project's compliance with the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM Validation and Verification Standard for project activities version 02
- CDM Project Standard for project activities version 02
- CDM project cycle procedure for project activities version 02
- VCS standard v3.7[3]
- VCS guideline v3.7

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

1.2 Scope and Criteria

The scope of the Joint validation and verification is the independent and objective review of the Joint Project Description & Monitoring Report. The Joint VCS PD & MR are reviewed against the relevant criteria (see 1.1) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The validation and verification were based on the guidance given in the CDM Project Standard for project activities version 02.0, CDM Project Cycle Procedure for project activities version 02.0, VCS guideline and standard version 3.7

[3] http://www.v-c-s.org/project/vcs-program/rules-and-requirements/

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

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

1.3 Level of Assurance

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

1.4 Summary Description of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy sources. The project activity aims to harness wind energy through installation of Wind PV project with total installed capacity of 397.5 MW wind power project and located in China. The project is promoted by Ningxia Zhongwei Aluminum New Energy Co., Ltd.

The Project activity is a new facility (Greenfield) and the electricity delivered by the project activity is exported to the Chinese power grid. The project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid.

The project activity results in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 727,982 tCO_2e per year, thereon displacing 948,633.80 MWh amount of electricity from the gird annually over the 10 years crediting period.

The project is located in Zhongwei City, Ningxia Hui Autonomous Region, People's Republic of China. The project started construction on 01/11/2016 and commissioned on 15/04/2017 and fully operation on 20/07/2017.

During the Current Monitoring Period from 15/04/2017 to 28/02/2019 (First and last date included) the project activity has supplied 2,001,008.63 MWh of electricity, and thus contributing to the GHG reductions 1,535,574 tCO_2e.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

Validation and Verification Scope: The scope is defined as an independent and objective review of the Joint project design document and Monitoring report. The Joint VCS PD and MR is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board and VCS standard and guideline version 3.7, including the approved baseline and monitoring methodology ACM0002 version 19.0 (for the present scenario in the project). The validation and verification were based on the requirements in the Validation and Verification Standard for project activities version 02.0, project standard for project activities version 02.0, project cycle procedure for project activities version 02.0 and VCS guideline and standard version 3.7.

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

Validation and Verification Process: The project assessment is based on the Clean Development Mechanism Validation and Verification Standard for project activities version 02.0 and VCS standard and guideline version 3.7 and is conducted using standard auditing techniques to assess the correctness of the information provided by the project proponents. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the VCS project activity are appointed.

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

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

II Follow-up interviews with project stakeholders;

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

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

Appointment of the assessment team

According to the sectoral scope / technical area and experience in the sectoral or national business environment, LGAI Technological Center S.A. (Applus+ Certification) has composed a project assessment team in accordance with the appointment rules in the internal Quality Management System of LGAI Technological Center S.A. (Applus+ Certification).

The composition of audit team shall be approved by the LGAI Technological Center S.A. (Applus+ Certification) ensuring that the required skills are covered by the team.

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

- Lead Auditor (LA).
- Auditor (A) / Auditor in Training (AiT).
- Technical Expert (TE).
- Technical Reviewer (TR).

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be covered by t he assessment team.

Name	**Role**	**SS Coverage**	**TA Coverage**	**Financial aspect**	**Host country experience**
Denny Xue	LA/TE	Yes	Yes	Yes	Yes
Simon Shen	TR	Yes	Yes	Yes	Yes

The complete list of CVs is included as Appendix 3 of this report.

Document review

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

Follow-up interviews

A site visit was conducted by LGAI Technological Center S.A. (Applus+ Certification) who performed interviews, telephone conferences, and physical site inspection with project stakeholders to confirm selected information and to resolve issues identified in the document review. The detail is provided in this report in the below sections.

Resolution of Clarification and Corrective Action Request

The objective of this phase of the Joint validation and verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for LGAI Technological Center S.A. (Applus+ Certification) positive conclusion on the project design and

Monitoring report. The Corrective Action Requests and Clarification Requests raised by LGAI Technological Center S.A. (Applus+ Certification) were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the validation process, the concerns raised and responses given are summarized below in the appendix 2.

The Joint VCS PD & MR Version 2.0 submitted by project owners on 07/04/2019 respectively serve as the basis for the final assessment presented. Additional changes to the project during the Joint validation and verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Internal quality control

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

After confirmation of the project owners the positive validation/verification opinion and relevant documents are submitted to the VCS secretariat through the VCS web-platform.

2.2 Document Review

The details of the document observed during the Joint validation and verification process are listed below in appendix 1 of this report.

2.3 Interviews

The site visit for the project activity was carried out from 14/03/2019 to 15/03/2019. No sampling procedures were adopted either in document verification and all the document were cross checked to ensure conservative estimation of emission reduction. Kindly find below names of the persons interviewed (during onsite and telephonic interview later) for the site.

No.	Name of Persons	Role/Designation
1	Mr. Sun Wenbo	PP Representative (Manager)
2	Ms. Lv Xin	PP Representative
3	Mr. Li Hongping	DRC
4	Mr. Li Jiadin	Villager
5	Mr. Li Gang	Villager
6	Ms. Liu Ting	Villager

2.4 Site Inspections

Duration of on-site inspection: 14/03/2019 to 15/03/2019				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Assessment team checked the implementation of the project, Baseline emission, Emission reduction calculation, technical description of the project and Monitoring.	Zhongwei City, Ningxia Hui Autonomous Region, People's Republic of China	14/03/2019 to 15/03/2019	Denny Xue

2.5 Resolution of Findings

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

The final Joint VCS PD & MR Version 2.0 submitted by project owners on 07/04/2019 serves as the basis for the final assessment presented. Additional changes to the project during the validation and verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation and verification findings	**No. of CL**	**No. of CAR**	**No. of FAR**
Project design document and Monitoring report	00	00	00
Description of project activity	00	00	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline	00	00	00
- Deviation from methodology	00	00	00
- Clarification on applicability of methodology, tool and/or standardized baseline	00	00	00
- Demonstration of additionality	00	01	00
- Emission reductions	00	00	00
- Monitoring plan	00	01	00
-Stakeholders consultation process	00	00	00
- Public comments	00	00	00
Others (please specify)-Matter related to double counting- **for validation**	00	00	00
Others (please specify)-Matter related to Emission reduction calculation- **for verification** ER achieved, Matter related to feeder details, breakdown and Calibration-**for verification**	00	00	00
Total	**00**	**Validation+ Verification: 02**	**00**

The list of findings and their resolution is presented in appendix 2 of this report.

2.5.1 Forward Action Requests

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

3 VALIDATION FINDINGS

3.1 Project Details

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy sources. The project activity involves total capacity of 397.5 MW wind power project which is installed in Zhongwei City, Ningxia Hui Autonomous Region, People's Republic of China. The wind project has been developed by Ningxia Zhongwei Aluminum New Energy Co., Ltd.

The Project activity is a new facility (Greenfield) and the electricity delivered by the project activity is exported to Chinese power grid. The project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid.

The estimated annual emission reductions from the project activity are 727,982 tCO_2e. The total emission reductions for 10 years crediting period will be 7,279,820 tCO_2e.

The project is located in Zhongwei City, Ningxia Hui Autonomous Region, People's Republic of China. The geographic coordinates of the project location are 106°41′32″ to 108°23′65″ east longitude and 37°14′05″ to 39°05′23″ north latitude confirmed by site visit.

The project started construction on 01/11/2016 and commissioned on 15/04/2017 and fully operation on 20/07/2017 by checking construction order, operation log and site visit.

During the Current Monitoring Period from 15/04/2017 to 28/02/2019 (First and last date included) the project activity has supplied 2,001,008.63 MWh of electricity, and thus contributing to the GHG reductions 1,535,574 tCO_2e.

Project Technology Details

The technical specifications are mentioned as below and the same were checked during site visit.

Wind turbine	
Rated capacity	1,500 kW
Impeller diameter	86.6~88.34 m
Wheel hub height	75 m
Cut-in wind speed	3.0 m/s
Rated wind speed	9.9 m/s
Cut-out wind speed	22 m/s
Max design wind speed	52.5 m/s
Rated voltage	690 V
Manufacturer	Dongfang Electric Corporation Dongfang Turbine Co., Ltd
Designed lifetime	20 years

Assessment team checked onsite and confirms that the details of the project proponent is as below:

Organization name	Ningxia Zhongwei Aluminum New Energy Co., Ltd
Contact person	Sun Ping
Title	Project Owner

Address	No 218, Xinchang West Road, Yinchuan City
Telephone	+86-951-6733432
Email	teng_hp@126.com

Assessment team checked onsite and confirms that the details of the other entity involved is as below:

Organization name	Beijing Cronus Technology Consultancy Centre
Role in the project	Consulting company
Contact person	Yao Baojie
Title	General Manager
Address	No 48, Xueyuan Road, Beijing, China
Telephone	+86-10-67618208,
Email	yaobaojie@126.com

Project Start Date

Start date of the project activity is the earliest date commission which is 15/04/2017. Assessment team checked the operation log to check the same.

Project crediting period Date

Assessment team confirms that the crediting period dates for the project is as below:

Crediting Period Start date: 15/04/2017

Crediting Period End date: 14/04/2027

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

Project Scale and Estimated GHG Emission Reductions or Removals

Assessment team confirms that the project is a Large Project that involves setting up of 397.5 MW Wind Project activity project.

Project Scale	
Project	
Large project	✓

As the estimated annual average GHG emission reductions or removal per year is 727,982 tCO_2e which is greater than 300,000 tonnes of CO_2e per year, thus the project falls in the category of Large Project.

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 1	727,982
Year 2	727,982
Year 3	727,982
Year 4	727,982
Year 5	727,982
Year 6	727,982

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 7	727,982
Year 8	727,982
Year 9	727,982
Year 10	727,982
Total estimated ERs	**7,279,820**
Total number of crediting years	**10**
Average annual ERs	**727,982**

The above estimated emission reduction is confirmed by assessment team via emission reduction calculation spreadsheet. The calculation is conservative and this acceptable to the assessment team.

Project location

The project is located in Zhongwei City, Ningxia Hui Autonomous Region, People's Republic of China. The geographic coordinates of the project location are 106°41′32″ to 108°23′65″ east longitude and 37°14′05″ to 39°05′23″ north latitude confirmed by site visit.

Conditions prior to project initiation

Assessment team during the desk review and onsite visit confirms that the project is a wind power project and does not involve generation of GHG emissions for the purpose of their subsequent reduction, removal or destruction. The baseline as described in section 3.3.4 of this report will continue to be the baseline in the absence of project activity.

Project compliance with applicable laws, statutes and other regulatory frameworks

Assessment team confirms that the Project has been approved by Chinese government by checking the Project approval and Environmental Impact Assessment (EIA) approval.

Based on the professional knowledge of the assessment team, it is able to confirm there are no laws forbid the construction of the project activity as a wind power project.

Project Ownership

Ningxia Zhongwei Aluminum New Energy Co., Ltd is the project owner and also project proponent (PP) of project activity and they have the legal right to control and operate the project activities.

The project ownership has been checked by the Assessment Team and demonstrated through checking business license and project approval.

Emissions trading programs and other binding limits

Assessment team confirms that the 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 in any Emission Trading program or other binding limits. Assessment team checked the REC Mechanism database of China and found that the project activity is not accredited/ registered under REC mechanism. Further, Declaration in effect of the same has been submitted by project proponent to audit

team and found to be correct. Thus, it is concluded that the project activity not involved on other Emissions trading programs and other binding limits.

Additional Information Relevant to the Project

Eligibility Criteria for grouped projects

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

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. The details are presented transparently to the assessment team for analysis which lead to positive conclusion for this validation and verification.

Sustainable Development

Contribution to sustainable development:

Assessment team found that the project contributes to sustainable development using the following ways.

· Reducing the emission of CO_2 and other pollutants compared with fuel-fired power plant;

· Creating local employment opportunities during the construction (more than 200 people) and operation (65 people) of the proposed project and improving the living standard of local people;

· With the help of the road, which was constructed due to the proposed project, agriculture and other products could be transported from the mountains of Xiangshan to city by Local farmers. It can reduce poverty, which is very important to Ningxia, a poverty-stricken region energy resource of NWPG;

· The implementation of the proposed project will help to change the energy structure, and thereby, contribute to the development of local economy;

· To construct such a large-scale wind power plant, the project owner spends a lot to purchase wind turbines and other auxiliary equipment such as transformers and distributed control system etc. The huge investment provides an opportunity for the expansion of related industrial branches and factories, hence stimulates the growth of wind power industry and development of wind power technology in China.

3.2 Participation under Other GHG Programs

The project has neither been registered nor seeking registration under any other GHG programs. The project is seeking registration only in VCS program. Audit team checked the REC Mechanism database of India and found that the project activity is not accredited / registered under REC mechanism. Further,

declaration for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

1. http://www.greenenergy.org.cn/
2. http://cdm.unfccc.int/
3. http://www.goldstandard.org/

Rejection by other GHG programs

The Project is not rejected by other GHG programs. A declaration for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

1. http://www.greenenergy.org.cn/
2. http://cdm.unfccc.int/
3. http://www.goldstandard.org/
4. http://verra.org/

The Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

Renewable energy certificates are available for trading in the host country However, the same is not availed by the project proponent. The undertaking regarding the same is submitted by PP which is acceptable to the assessment team and assessment team also checked the REC web site (http://www.greenenergy.org.cn/) and found the declaration to be correct.

3.3 Application of Methodology

3.3.1 Title and Reference

Assessment team checked that following methodology and tools are applicable for the project activity. The details are as below:

Title: Grid-connected electricity generation from renewable sources

Reference: The project activity meets the eligibility criteria of large-scale project as it is more than 15 MW

Methodology : ACM0002: Grid-connected electricity generation from renewable sources - ACM0002 version 19.0[4]

Type I : Energy industries (renewable / non-renewable sources)

Category: Approved Consolidated Methodology

Tools referred with above methodology and applicable for project activity are:

[4] http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP

- Tool to calculate the emission factor for an electricity system[5] - Version 07.0 (EB 100, Annex 04)
- Methodological Tool- Tool for the demonstration and assessment of additionality[6] - Version 07.0.0 (EB 70, Annex 08)

3.3.2 Applicability

The applied baseline methodology is justified as it has been demonstrated that the proposed project activity is:

Applicability 1: The project activity is installation of a new grid connected wind power plant (Option 1 (A)) at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.

Applicability 2: The proposed project activity is an installation of a new grid connected wind power plant and hence this condition is met. The option (a) of applicability criteria 2 is applicable as project is renewable energy power plant/unit.

Applicability 3: The project is installation of new wind energy-based electricity generation plants (not a hydro power plant). Hence this criterion is not applicable.

Applicability 4: The project is wind power project and thus the criterion is not applicable to this project activity.

Applicability 5: The project is wind power project and thus the criterion is not applicable to this project activity.

Applicability 6: The project is wind power project and thus the criterion is not applicable to this project activity.

Applicability 7: The project activity is installation of a new grid connected wind power project and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the project activity.

This is a wind power plant and not a biomass fired plant and hence this applicability criterion is not applicable to the project activity.

Applicability 8: The project activity is a new grid connected wind power plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.

Applicability 9: Please refer below

Applicability conditions of "Tool to calculate the emission factor for an electricity system"

- OM, BM and CM are estimated using the tool for calculating baseline emissions.

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[6] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

- The project activity is grid connected and thus emission factor is calculated and thus OM, BM and CM are estimated using the tool for calculating baseline emissions.

- The project activity is located in India, a non-Annex I country. Therefore, tool is applicable for the project activity.

- The project is a wind power project and there is no involvement of biofuels. Therefore, this criterion is not applicable for the project activity.

LGAI Technological Center S.A. (Applus+ Certification) confirms that the application of the baseline methodology is transparent and conservative and confirms that the chosen baseline and monitoring methodology i.e. ACM0002 version 19.0 is applicable to the project activity.

The project activity qualifies as Type I during every year of the crediting period in accordance with applicable provisions for project activity eligibility as discussed above. Also, the total installed capacity of project activity is more than 15 MW which is applicable as per large scale project activities methodology ACM0002 version 19.0. The project capacity will be always remain the same and hence the project activity will always be large scale project activities throughout the crediting period and thereafter.

3.3.3 Project Boundary

Project boundary has been ascertained and confirmed during the site visit using ACM0002 version 19.0 – "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".

Hence the project boundary includes the renewable energy power generation, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the grid. The boundary also extends to the project power plant and all power plants connected physically to the electricity system that the VCS project power plant is connected to.

The calculation of net electricity supplied to grid is under purview of state electricity board and project activity Owner or project activity Implementer does not have any control on it. Thus, for project activity, net electricity supplied to grid is the monitoring parameter which is used for ER calculations.

It is to be noted that metering arrangement is under control of state electricity board and PP do not have any control on it.

The sources and GHG gases involved for proposed Project activity are as below

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	No other emissions are emitted from the project
Project	Greenfield Wind Power Project Activity.	CO_2	No	No CO_2 emissions are emitted from the project
		CH_4	No	Project activity does not emit CH_4
		N_2O	No	Project activity does not emit N_2O

Source		Gas	Included?	Justification/Explanation
		Other	No	Project activity does not emit other forms of GHG emissions

3.3.4 Baseline Scenario

Assessment team confirms that being a grid connected wind energy generation project, PP developed the project based on the Methodology ACM0002 version 19.0. As per methodology *if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:*

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

As per CDM Validation and Verification Standard for project activities version 02, "where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the Joint VCS PD & MR selected to determine the most realistic baseline scenario." Thus, Joint VCS PD & MR should mention the credible alternatives to the project activity in order to determine the most realistic baseline scenario. As the selected large-scale methodology clearly mention the baseline scenario and the same has been opted in this project, therefore, no further analysis on baseline is required.

Assessment team, therefore, concludes that the Joint VCS PD & MR conforms to the guidance given by EB via CDM Validation and Verification Standard for project activities version 02 and VCS via VCS standard version 3.7.

The project activity involves setting up wind projects to harness the power of sun and wind to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants.

In the absence of the project activity, the equivalent amount of power would have been drawn from the Indian grid. Hence, the baseline for the project activity is the equivalent amount of power from the Indian grid.

The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source (where available) and made publicly available. The 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 is the latest available data at the time of Joint VCS PD & MR submission to DOE for validation, hence same is considered for emission factor calculations.

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

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.7674 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from 2017 Baseline Emission

		in year y	Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
$EF_{grid,OM,y}$	0.9155 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
$EF_{grid,BM,y}$	0.3232 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA

Assessment team thus confirmed that baseline is selected as per the applied methodology and combined margin is calculated as per the tool and thus acceptable to the assessment team.

3.3.5 Additionality

During conceptualization of the project activity, board of directors of the project proponents considered the VCS revenue to improve the project financials. During the board meeting for board of Directors decided that they would consider VCS revenue for their project activity. In continuation to the board decision, PP issued the respective purchase order for the supply of wind plant.

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first-of-its-kind. Hence not applicable.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Alternative 1: The proposed project activity without VCS benefit;

Alternative 2: Continuation of the current situation, i.e., electricity will continue to be generated by the existing generation mix operating in the grid.

Having regard to the fact that the project activity under consideration is a wind power project, assessment team is convinced that there are no other realistic and credible alternatives. Both the alternatives are in compliance with all applicable legal and regulatory requirements as;

- the implementation of project activity is a voluntary initiative and is not mandatory or a legal requirement;
- the applicable environmental regulations do not restrict the use of wind energy; and
- There is no legal requirement on the choice of a particular technology.

However, of the two alternatives identified, alternative (i) cannot be considered realistic as further analysis in the following paragraph reveals that it is not economically feasible option. Hence, alternative (ii) alone could be justified as realistic, credible and plausible alternative to the PP.

Assessment team is, therefore, convinced that the project developer has taken into consideration all realistic and credible alternatives (having regard to the governing methodologies) including the project being undertaken as a non-VCS activity and continuation of current scenario. The identification of alternatives is in conformity with the guidance given by the tool.

Outcome of Sub-step 1a: All the realistic alternatives for the project activity have been enlisted above.

Sub-step 1b: Consistency with mandatory laws and regulations:

The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.)

Both the alternatives are in compliance with all applicable legal and regulatory requirements as;

- The implementation of project activity is a voluntary initiative and is not mandatory or a legal requirement;
- The applicable environmental regulations do not restrict the use of wind energy; and
- There is no legal requirement on the choice of a particular technology.

Moreover, Outcome of Sub-step 1b: Hence, both the alternatives enlisted above are found to comply with the mandatory laws and regulations taking into account the enforcement of the legislations in the region or country and EB decisions on national and/or sectoral policies and regulations. However, Alternative 2 has been selected as the appropriate baseline alternative for this project activity.

Step 2: Investment analysis

Determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of emission reductions credits. To conduct the investment analysis, use the following sub-steps:

Sub-step 2a: Determine appropriate analysis method and Sub-step 2b (Option III): Apply benchmark analysis

a) Suitability of investment analysis, financial indicator and benchmark:

As the project generates financial and economic benefits other than VCS related income through the sales of electricity and the alternative for the baseline scenario of the project does not involve an investment for the project proponents, a benchmark analysis (Option III) is justified for conducting the investment analysis in accordance with the “Tool for the demonstration and assessment of additionality” version 07.0.0

An 8% project-IRR (after tax) was used as benchmark value as common value for wind farm project in China, which is determined according to Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects public by China Electric Power Press dated March 2003. This value has been checked

against the source and the suitability for this project can be confirmed that the selected benchmark is applicable for the project activity and widely used in China.

Thus, assessment team is able to confirm the suitability of this benchmark.

b) Parameters and assumptions used:

The assessment team has verified and crosschecked all the input values used for the IRR calculations in the Joint VCS PD & MR submitted for registration and verification. The input parameters used in the financial analysis are taken from FSR.

An approval letter of the FSR is issued by the government only after it passes the assessment of the sector experts designated by the government. It is in assessment team's opinion that the FSR can be regarded as a reliable and trustworthy source of information coming from a recognized entity once it has been approved by the government. The FSR for the project was developed by a qualified third-party designing institute Shanghai Investigation, Design & Research Institute and approved by Development and Reform Commission of Ningxia Hui Autonomous Region on 07/01/2017.

The assessment team compared the values stated in the final Joint VCS PD & MR with the values sourced from the FSR and was able to confirm that the input values are applied correctly in the Joint VCS PD & MR which is in accordance with CDM Validation and Verification Standard for project activities version 02.

Parameters	Unit	Value	Source
Total Investment	10^4 RMB	397,089.10	FSR
Static Asset	10^4 RMB	389,500.00	FSR
Bank loan	10^4 RMB	309,760.00	FSR
Loan Interest	%	4.90	FSR
Fluid Capital	10^4 RMB	1,188.50	FSR
Electricity Tariff (including VAT)	RMB/kWh	0.54	FSR
Annual Power Supply	MWh	948,633.80	FSR
Income Tax	%	25	FSR
Value-added Tax	%	17	FSR
City Maintenance and Construction Tax	%	7	FSR
Educational Surcharge Tax	%	3	FSR
Depreciation year	year	15	FSR
Depreciation Rate	%	6.33	FSR
Residue Rate	%	5	FSR
Annual O&M cost	10^4RMB/ yr	11,095.00	FSR
Employee	Person	65	FSR
Welfare rate	%	41	FSR
Insurance Rate	%	0.25	FSR
Maintenance rate (2-3)	%	1.2	FSR
Maintenance rate (4-6)	%	1.5	FSR
Maintenance Rate (7-21)	%	1.8	FSR
Other fee	10^4RMB/ yr	1,987.50	FSR
Material fee	10^4RMB/ yr	596.25	FSR

Operation year	year	20	FSR

Also the parameters of other registered wind farm projects in Ningxia Hui Autonomous Region are listed below:

Ref No.	Project Name	Installed capacity (MW)	Total static investment (million RMB)	Unit static investment (RMB/kW)	PLF (Power Load Factor)	Annual average OM cost (million RMB)	Annual average OM cost per Installed ca (RMB/W)
8187	Ningxia Haiyuan Wind Farm (Songjiayao) Huadian 49.5MW Wind Power Project	49.5	403.0240	8,141.90	21.31%	13.19	0.2665
6989	Huadian Ningxia Haiyuan Xiajiayao 49.5MW Wind Power Project	49.5	403.3554	8,148.59	20.92%	11.57	0.2337
6915	Huadian Ningxia Haiyuan Ganganliang 49.5MW Wind Power Project	49.5	403.6083	8,153.70	21.00%	11.58	0.2339
7644	Ningxia Tongxin (Zhangjiayuan Haitanghu) Huifeng Wind Farm Project	49.5	409.1470	8,265.60	21.16%	12.28	0.2480
7085	Huadian Ningxia Haiyuan Danangou 49.5MW Wind Power Project	49.5	419.6383	8,477.54	20.95%	11.89	0.2402
7051	Huadian Ningxia Haiyuan Daju 49.5MW Wind Power Project	49.5	428.0612	8,647.70	21.12%	12.45	0.2515
8511	Ningxia Power Investment Lingwu Wind-farm Phase I 49.5MW Project	49.5	428.8900	8,664.44	22.30%	13.55	0.2737
7628	Ningxia Tongxin (Zhangjiayuan Sutai) Huifeng Wind Power Project	49.5	429.6681	8,680.16	22.10%	12.75	0.2576
7784	Huadian Ningxia Ningdong Phase VI Wind Farm Project	49.5	430.7892	8,702.81	21.54%	9.72	0.1964
7602	Ningxia Helanshan Wind-farm (Touguan) Dalisi 49.5MW Wind Power Project	49.5	432.2770	8,732.87	22.90%	11.08	0.2237
7038	Ningxia Zhongwei Xiangshan Wind-farm China Power Investment Corporation Liujiashan 49.5MW Project	49.5	433.5250	8,758.08	22.60%	12.54	0.2533
8125	Ningxia Zhongwei Xiangshan Wind-farm Guodian Zhuanwazitang 49.5MW Project	49.5	435.5700	8,799.39	22.30%	12.47	0.2519
6356	China Power Investment Corporation Ningxia Zhongwei Xiangshan Phase III Wind-farm Project	49.5	436.8000	8,824.24	23.00%	12.61	0.2547
8168	Ningxia Haiyuan Wind Farm (Tuoliebao) Huadian 49.5MW Wind Power Project	49.5	437.1455	8,831.22	21.56%	13.93	0.2814
7101	Ningxia Zhongwei Xiangshan Wind-farm China Power Investment Corporation Fanjiazhai 49.5MW Project	49.5	437.3840	8,836.04	22.30%	12.43	0.2511
8314	Qingtongxia (Shashidunliang) Wind Farm Ningxia Datang International 48MW Wind Farm Project	48	428.0500	8,917.71	21.85%	12.81	0.2669
9041	Ningxia Jingneng Lingwu Xinhuo Wind Farm Project	49.5	443.3786	8,957.14	22.10%	10.72	0.2166
8130	Ningxia Lingwu Jingneng Phase I Wind Farm Project	49.5	446.9980	9,030.26	22.64%	11.30	0.2283
8481	Ningxia Guyuan Wind Power Dunan Zhaike 48 MW Project	48	435.7964	9,079.09	22.98%	13.76	0.2867
8177	Ningxia Guyuan Wind Farm Tianrun Sanying 49.5MW Project	49.5	450.7445	9,105.95	22.11%	13.22	0.2672
7264	Huadian Ningxia Ningdong Phase V Wind Farm Project	49.5	453.9374	9,170.45	21.66%	10.11	0.2042
7927	Ningxia Yanchi Mahuangshan Wind Farm (Wanglejing) Hanas Phase I Project	49.4	458.6400	9,284.21	21.97%	11.62	0.2352
6751	Ningxia Tongxin (Zhangjiayuan Xianyazi) Datang Wind Farm Project	49.5	459.9520	9,291.96	22.63%	11.57	0.2338
6705	Ningxia Ningdong Wind Farm (Lingwu Changliushui) Datang Angli 49.5MW Project	49.5	460.3198	9,299.39	22.37%	11.01	0.2223
7343	Ningxia Tongxin (Magaozhuang Laijiawa) Datang Wind Farm Project	49.5	461.5840	9,324.93	22.47%	11.60	0.2344
6685	Ningxia Ningdong Wind Farm (Lingwu Shagou) Datang Angli 49.5 MW Project	49.5	463.2559	9,358.71	22.40%	11.06	0.2234
6898	Ningxia Tongxin Datang New Energy Phase I Wind Farm Project	50	468.3488	9,366.98	22.66%	11.72	0.2344
6991	Ningxia Tongxin (Magaozhuang Lixian Yazi) Datang Wind Farm Project	49.5	466.0823	9,415.80	22.71%	11.69	0.2362
8104	Ningxia Yanchi Mahuangshan Wind Farm (Wanglejing) Master Phase I Project	49.4	465.5200	9,423.48	21.97%	11.70	0.2368
6893	Ningxia Hongsipu Shibanquan Wind Power Guodian Phase I 49.5MW Project	49.5	487.5160	9,848.81	23.06%	12.03	0.2430
Project Activity		**397.5**	**3,895.0000**	**9,798.74**	**27.24%**	**110.95**	**0.2791**

The accuracy and suitability of the input values for the investment analysis were crosschecked as below:

1. Static Asset

The static asset of the project activity is 389,500.00*10^4 RMB sourced from FSR. Among the total static assets, the costs for equipment purchasing were estimated to be 301,004.30*10^4 RMB.

As the installed capacity of the project is 397.5 MW verified by checking Purchase contract of Wind turbine and site visit, the unit investment of the project is 9,798.74 RMB/kW which is in the range of other registered wind farm projects in Ningxia Hui Autonomous Region which is 8,141.90 ~ 9,848.81 RMB/kW. Moreover, the unit investment of the project activity is compared with the values presented by one of the most famous wind energy studies in the world, “Wind Energy- The facts” implemented by a consortium led by the European Wind Energy Association (EWEA) (http://www.wind-energy-the-facts.org/documents/download/Chapter3.pdf) published in March 2009. The investment costs per kW typically vary from around €1,000/kW to €1,350/kW (equivalent to 9,094 RMB/kW to 12,277 RMB/kW with an exchange rate available at the time of the report publication, i.e. 9.094 RMB/Euro on 31/03/2009, www.x-rates.com). The assessment team checked the data sources and confirms that the justification is credible, and the unit investment cost of the project activity is within this range.

Furthermore, the static asset is crosschecked by checking Final Accounting Report issued by third party institution. The actual total amount of static asset is 395,045.00*10^4 RMB which has higher than the amount applied in the FSR.

Therefore, the total static asset is considered justified.

2. Annual Power Supply

The annual power supply from the project activity is 948,633.80 MWh which is determined by the installed capacity (397.5 MW) and annual operation hours (2,386.5 hours), the installed capacity has been verified by checking Purchase contract of Wind turbines and site visit. And annual operation hours are determined according to FSR compiled by Shanghai Investigation, Design & Research Institute which is an accredited independent third party.

According to the FSR, the annual power supply is estimated based on the records of wind statistic data recent 38 years provided by local meteorological station. The FSR institute first calculated the theoretical annual power generation using the professional software to predict wind climates, wind resources, and power productions of the wind farm. The volume of annual generation therefore is expected to accurately represent the long-term average power supply during the lifetime of the wind farm, taking into account yearly variations in power generation, and it is not credible to assume that generation would be significantly higher over the lifetime of the proposed project than that which can be expected from the long-term averages.

As per the FSR, the estimated net supplied power is calculated from the turbine availability, grid availability and the wind speed. The calculations for the proposed project are carried out using professional software designed for the wind energy industry. The output is maximized through selection of the most suitable turbines, optimal turbine distribution in the wind farm, and considering the specific turbine characteristics, and the grid connection. The output calculations account for issues such as air density corrections, turbine efficiency, planned maintenance, contaminated rotors, and auxiliary power use, etc. The method of anticipating power generation is also approved by the government and is widely used in China for wind energy.

The plant load factor (PLF) of the project has been calculated under the EB 48 Annex 11. The guidelines for the reporting and validation of PLF, is based on FSR of this project and was determined by Shanghai Investigation, Design & Research Institute, which is the accredited independent third party. The annual operation hour of the station is determined to be 2,386.5 hours sourced from the FSR and the corresponding PLF is 2,386.5 / 8,760 = 27.24% Also by comparing other registered wind farm projects in Ningxia Hui Autonomous Region, the PLF 27.24% and annual operation hours 2,386.5 is higher than 20.92% ~ 23.06%. Thus, the annual operation hours and corresponding plant load factor are conservative.

Therefore, the assessment team confirmed annual power supply is deemed to be conservative.

3. Electricity tariff

The electricity tariff of 0.54 RMB/kWh (Inc. VAT) applied for the proposed project was in line with the FSR, which is consistent with the tariff guideline “Notice about completing the on-grid power tariff with the wind power generation from NDRC of China”, FaGaiJiaGe [2015] No.3044 dated 22/12/2015. According to this official tariff document that there are four wind resource regions in China based on the analysis of wind

energy resources and standard for engineering construction. The tariff for wind power projects located in Ningxia Hui Autonomous Region which belong to III wind resource region is 0.54 RMB/kWh (incl. VAT). The FSR of the project activity was completed on January 2017 and approved on 07/01/2017. Then this notification should be applicable for the project activity. Thus, the assessment team deems that it is reasonable to apply the tariff of 0.54 RMB/kWh (incl. VAT) for the proposed project activity.

Therefore, the assessment team consider the electricity tariff used is applicable, valid and credible.

4. Annual O&M cost

The O&M cost for wind farm projects may vary by site location, conditions for transportation, applied technology, installation and regional inflation.

The O&M cost is composed of salary and welfare, repair cost, insurance expenses and other fee (including material fee). By checking FSR, the annual average O&M costs is $11,095*10^4$ RMB

The unit O&M cost 0.2791 (RMB/W) is in the range of 0.1964 ~ 0.2867 (RMB/W) for other registered wind farm projects in Ningxia Hui Autonomous Region listed in the above table.

Salary and Welfare: Salary and welfare is determined by the number of workers, annual salary of the worker and welfare rate.

In May 2010, the Water Resources and Hydropower Planning and Design General Institute (MWH) which is the administrative department of wind farm project in China issued an exposure draft of Construction Standard for Wind farm project. The draft version of standard has not taken effect yet, but the assessment referred to the standard to crosscheck some input figures for financial analysis considering that the standard is drafted by the administrative department of wind farm project in China integrated the common practical experience in wind farm projects in recent years.

The number of the workers applied in the IRR calculation is 65 which is adopted from the FSR. This is slightly higher than the requirement in the Construction Standard for Wind farm project in which indicate that a wind farm project bigger than 300 MW but lower than 400 MW, the number of the workers should not exceed 60.

Annual salary of the workers applied in the IRR calculation is opted from the FSR which is 100,000 RMB/yr. By checking China Statistical Yearbook 2018, in which indicate that the annual salary of the workers of energy industry in Ningxia Hui Autonomous Region in 2017 is 103,768 RMB/yr which is higher than the value applied.

Even more, the product of value applied 65 of the number of the workers and 100,000 RMB/yr of annual salary is quite close to the product of value applied 60 of the number of the workers and 103,768 RMB/yr of annual salary. Therefore, the salary applied in the IRR calculation is not over estimated.

Welfare rate used in the calculation is adopted from FSR which is 41%. According to Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects public, the total cost of welfare, labor insurance, public funding, medical insurance and social insurance fund, unemployment insurance could be summed up to be 48.5~50.5%. Therefore, the valued applied in the calculation is considered as conservative.

Repair cost: The maintenance rate applied in the IRR calculation is adopted from the FSR which is 1.20% for the year 2~3 of operation period, 1.50% for the year 4~6 of operation period and 1.8% for the year 7~21 of operation period. According to Construction Standard for Wind farm project, the average maintenance cost rate during all the operation period could be estimated to be in the range of 1.2~2.0%. Therefore, the maintenance rate applied in the calculation is reasonable.

Other fee and material fee: The other fee and material fee applied in the IRR calculation is adopted from the FSR which is 15 RMB/kW and 50 RMB/kW respectively (65 RMB/kW in total). As indicated in the Construction Standard for Wind farm project, the other fee (including material fee) could be estimated to in the range of 30~50 RMB/kW. Therefore, the applied value is slightly higher than value suggested in the Construction Standard for Wind farm project, however when apply 50 RMB/kW in the IRR calculation, the IRR is still lower than the benchmark. Also, the other fee is composed of metrological cost, management, training, travelling etc. Therefore, the sum of other fee and material fee is considered as justified.

Insurance expenses: The insurance rate applied in the IRR calculation is adopted from FSR which is 0.25%. According to Budget Estimation Method and Calculation Standard on the Design of Feasibility Study Report of Wind Farm Project compiled by Water Resources and Hydropower Planning and Design General Institute (MWR), the insurance rate could be 0.4~0.5%. Therefore, the value applied in the IRR calculation is conservative.

Furthermore, as the project has started operation, by checking actual OM in the first operation year, it is confirmed the actual cost is 93.34 million RMB which is lower than the 20 years average O&M cost 110.95 million RMB which is reasonable as low repair cost in the beginning of the operation. When apply this value in the IRR calculation, the IRR is still under benchmark.

It is assessment team's opinion that the O&M costs value for the project is reasonable.

5. Taxes

The taxes in the financial assessment are listed as:

Items	Value	Reference
Value added tax	17%	Ministry of Finance and the State Administration of Taxation: Notice about VAT Policy of China (CaiShui [2008] No. 170) Interim Regulations of the People's Republic of China on Value Added Tax (No. 538) Notice of the about Policies regarding the Value Added Tax on Products Made through Comprehensive Utilization of Resources and Other Products (CaiShui [2008] No. 156)
Income tax	25%	Income Tax Law of the Peoples Republic of China for Enterprises
City Maintenance and Construction Tax	7%	Interim Rules on Additional Tax for City Development, GuoFa[1985] No.19
Educational Surcharge Tax	3%	Provisional Regulations of the People's Republic of China on Education tax

(a) VAT for equipment

17% VAT used in the IRR calculation is adopted from FSR which is compliance with the Interim Regulations of the People's Republic of China on Value Added Tax is (No. 538) effective since 01/01/2009 in which the VAT is set up as 17% for purchase goods. Also, according to Notice about VAT Policy of China (CaiShui [2008] No. 170) effective since 01/01/2009, the equipment VAT can be credited over the operation period against the tariff VAT until the VAT from the equipment VAT is fully recovered. For this project, it will happen on the 7th operation year in IRR calculation.

(b) VAT for electricity

The VAT rate on the tariff of 17% applied to the financial analysis is substantiated by the following arguments.

On 13/12/1993, the Provisional Regulations of the People's Republic of China on Value Added Tax (GuoWuYuanLing[1993] No.134) was issued by State Council and became effective on 01/01/1994. Under this Regulation ([1993] No.134), the VAT occurred on the sales of electricity was stipulated to be 17%.

On 01/12/2001, the Provisional Regulations of the People's Republic of China on Value Added Tax (CaiShui[2001] No.198) was issued by Ministry of Finance and the State Administration of Taxation, and become effective on 01/01/2002. As stated in this notice (CaiShui [2001] No.198), the payable value added tax should be half levied for sales of electricity generated from the wind power. Based on the documents introduced above, the VAT rate involved in some wind power projects with the commission dates after 2002 is 8.5%, i.e. half of 17%.

However, on 09/12/2008, the "Notice of the about Policies regarding the Value Added Tax on Products Made through Comprehensive Utilization of Resources and Other Products (CaiShui [2008] No. 156)" was issued by Ministry of Finance and the State Administration of Taxation and become effective on 01/01/2009. As stipulated in this notice (No.156 [2008]), VAT refund half upon levy shall be applicable for selling the electricity generation from wind power etc. The regulation entered into force on 01/01/2009 and the former regulation (CaiShui [2001] No.198) was repealed simultaneously.

Based on the document introduced above, the VAT rate adopted by the proposed project is 17%. Half of the VAT incurred by the electricity sales has been annually recovered from the 7th operation year to 20th operation year after the equipment VAT is fully recovered.

(c) Income Tax

The 25% income tax rate is in incompliance with Income Tax Law of the Peoples Republic of China for Enterprises effect since 01/01/2008, according which the income tax rate is set up as 25%.

(d) City Maintenance and Construction Tax

The 7% City Maintenance and Construction Tax is in incompliance with Provisional Regulations of the People's Republic of China on City Maintenance and Construction Tax, according which Urban Maintenance & Construction Tax is set up as 7% when the taxpayer is in the city.

(e) Educational Surcharge Tax

The 3% Educational Surcharge Tax is in accordance with Provisional Regulations of the People's Republic of China on Education tax, in which added Educational Surcharge Tax is set up as 3%.

By cross checking with the national taxation regulations, sectoral regulations and other evidences, the assessment team was able to confirm that the taxation rates in the financial assessment are all in line with national regulations.

6. Residual value and depreciation period

The residual value is set 5% derived from the FSR and the residual value of the project activity assets has been included as a cash inflow in the final year at the end of the operation period reflected in the IRR calculation spreadsheet. According to the Enterprise Income Tax Law of the People's Republic of China ([2007] No.512), the net residual value of a fixed asset shall be reasonably determined by an enterprise according to the nature and condition of the fixed asset. It may not be changed once determined. Therefore, the rate of residual value (5%) applied to the proposed project is deemed to be acceptable.

Regarding to the depreciation period, 15 year is used in the calculation sourced from the FSR. According to the Enterprise Income Tax Law of the People's Republic of China ([2007] No.512), an enterprise shall begin computing depreciation for a fixed asset in the month following the month in which the asset is into service and shall cease computing depreciation for a fixed asset in the month following in which the asset's use is ceased. The minimum number of years for computing depreciation of fixed assets is 10 years for the manufacturing and business operations. Therefore, the depreciation period of 15 years for the proposed project is in line with the Enterprise Income Tax Law of the People's Republic of China ([2007] No.512). Furthermore, according to Construction Standard for Wind Farm Project that the depreciation period of the wind farm project could be estimated within the range of 10-15 years. Then depreciation period used is considered as reasonable. Then depreciation period used is considered as reasonable.

With the 5% residual value and 15 years operation period, 6.33% depreciation rate is then determined.

7. Loan amount and loan interest rate

The loan amount applied in the IRR calculation is sourced from FSR which is lower than loan contract in which the bank promise to loan the project owner $39,000*10^4$ RMB. When considering such loan amount in the IRR calculation, the IRR is still under benchmark.

The loan interest rate applied in the IRR calculation is sourced from FSR which is 7.05%. This is in line with Benchmark loan interest rate of China which is also 4.90% when the FSR was compiled on January 2017.

8. Technical Lifetime

As required in the last version of Investment Analysis, the project IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime). In general, a minimum period of 10 years and a maximum of 20 years will be appropriate.

The assessment team thus is convinced that the value of 20 years is appropriate.

Conclusion

Based on the information verified above, the assessment team confirms that all the input values for investment analysis are in reasonable ranges. In addition, the assessment team was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

Sensitivity analysis:

The Guidance on Appendix of Methodological tool "Investment Analysis" Version 09.0 requires the robustness of the conclusion arrived at to be proved through a sensitivity analysis by varying the critical assumptions to a reasonable variation. The project developer has identified Static Asset, Annual Power Supply, Electricity tariff and Annual O&M cost as critical assumptions. These critical parameters constitute more than 20% of either total project costs or total project revenues. The sensitivity analysis reveals that even under more favourable conditions, the IRR without VCS revenue would not cross the benchmark return as given in the below:

Static Asset

When static asset varied from -10%~+10%, the IRR varied from 8.34%~5.42%. Also, a critical test was performed, when static asset decreased 7.95%, the IRR will reach benchmark.

However, according to China Statistical Yearbook 2018 complied by National Bureau of Statistics of China, the product price index, consumer price index and wage are continuously increasing or remain in a high level in these years which have a direct impact to the static asset.

Furthermore, according to Final Accounting Report issued by third party institution. The actual total amount of static asset is 395,045.00*104 RMB which has higher than the amount applied in the FSR.

Therefore, there is no way that the static asset decrease 7.95%.

Electricity Tariff

When electricity tariff varied from -10%~+10%, the IRR varied from 5.19%~8.26%. Also a critical test was performed, when electricity tariff increased 8.20%, the IRR will reach benchmark.

However, according to the "Notice about completing the on-grid power tariff with the wind power generation from NDRC of China", FaGaiJiaGe [2015] No.3044 dated 22/12/2015, the electricity tariff for the project located in Ningxia Hui Autonomous Region is 0.54 RMB/kWh which is exactly the value applied in the IRR calculation.

Considering the electricity tariff is strictly control by the government, therefore this is very unlikely that the electricity tariff will increase 8.20%

Annual Electricity Supply

When annual electricity supply varied from -10%~+10%, the IRR varied from 5.19%~8.26%. Also a critical test was performed, when annual electricity supply increase 8.20%, the IRR will reach the benchmark.

The annual electricity supply is determined by installed capacity and annual operation hour. It is confirmed by on-site visit, that the installed capacity is 397.5 MW also verified by checking Purchase contract of Wind turbines. For annual operation hours, it is sourced from the FSR which is compiled by an accredited third-party institution based on records of wind statistic data recent 38 years provided by local meteorological station and one-year wind resources assessment. The FSR institute first calculated the theoretical annual power generation using the professional software to predict wind climates, wind resources, and power productions of the wind farm. Therefore, it is very unlikely that the annual operation hours of the plant will increase hugely.

Therefore, it is assessment team's opinion that the annual electricity supply will not increase 8.20%.

Annual O&M cost

When O&M cost varied from -10%~+10%, the IRR is still under benchmark. Also a critical test was performed, when O&M cost decrease 36.50%, the IRR will reach the benchmark.

However, according to China Statistical Yearbook 2018 complied by National Bureau of Statistics of China, the product price index, consumer price index and wage are continuously increasing in these years which have a direct impact to the O&M cost.

Furthermore, as the project has started operation, by checking actual OM in the first operation year, it is confirmed the actual cost is 93.34 million RMB which is lower than the 20 years average O&M cost 110.95 million RMB which is reasonable as low repair cost in the beginning of the operation.

Therefore, it is assessment team's opinion that it is very unlikely O&M cost will decrease 36.50%

As a conclusion, it is assessment team's conclusion that sensitivity analysis used is appropriate and reasonable.

Common Practice analysis:

The common practice analysis is proved by following points as per the requirement of Methodological tool "Common Practice", version 03.1 EB 84, Annex 7[7]:

1. Applicable Geographical Area (Para 9): As in China there are significant differences in terms of wind resources, policies, regulations and economic conditions among different provinces. Therefore, wind power projects in different provinces face very different investment climate, and it is a common practice to set the applicable geographical area at provincial level for wind power projects in China. Therefore, it is reasonable to set the applicable geographical area as Ningxia Hui Autonomous Region.

2. Measure (Para 10): The project activity reduces greenhouse gas emissions by generating electricity using renewable energy source- wind. Therefore, the project activity falls under the following measure:

[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf

(b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies.

3. Output (Para 11): The project activity produces electricity. Therefore, electricity is considered as output of the project activity.

4. Different Technologies (Para 12): The project activity uses wind energy for producing electricity and hence as per Para 12(a), the technologies which use energy source/ fuel other than wind will be considered as the different technologies for the project activity.

For the concerned project activity, Common Practice Analysis has been carried out for 397.5 MW capacity wind Power Projects in these states which is developed by **Ningxia Zhongwei Aluminum New Energy Co., Ltd**.

Stepwise approach for common practice analysis has been carried out as per Methodological tool "Common Practice", version 03.1 EB 84, Annex 7:

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

Range	Capacity	Unit
-50%	198.75	MW
Capacity of the proposed project activity	397.5	MW
+50%	596.25	MW

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

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

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

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows:

a) As the projects are located in Ningxia Hui Autonomous Region, therefore, projects in the geographical area of Ningxia Hui Autonomous Region has been chosen for analysis.

b) The project activity is a green-field wind power project and uses measure (b) “Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies”. Therefore, projects applying same measure (b) are candidates for similar projects.

c) The energy source used by the project activity is wind energy. Hence, only wind energy projects have been considered for analysis.

d) The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.

e) The capacity range of the projects is within the applicable capacity range from 198.75 MW to 596.25 MW.

f) The start date of the concerned project activity is 15/04/2017. Therefore projects, which have started commercial operation before 15/04/2017, have been considered for analysis.

By checking statistics of China Wind Farm Installed Capacity 2013, 2014, 2015, 2016 and 2017, which were issued by China Wind Energy Association have indicated that there is 0 project that deliver the same output or capacity as the proposed project activity and have started commercial operation before the start date of the project.

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}.

According to the result of step (2), as there is 0 project that deliver the same output or capacity as the proposed project activity and have started commercial operation before the start date of the project. Therefore:

$N_{all} = 0$

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}.

According to the result of step (3), as $N_{all} = 0$, therefore:

$N_{diff} = 0$

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

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

As per methodological tool “common practise” version 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.

Thus, if both conditions are fulfilled, then project activity will be a common practise otherwise, the project activity is treated as not a common practise.

Outcome of Common Practise analysis:

As,

i. F = 0; is not greater than 0.2

ii. N_{all} - N_{diff} = 0; is not greater than 3

Thus, the proposed project activity is not a “common practice” within a sector in the applicable geographical area.

The above discussions show that wind power development is not a common practice and the project activity is not financially attractive; hence the project activity is additional and the assessment team considers the approach and calculations acceptable as per the requirements in the methodological tool.

3.3.6 Quantification of GHG Emission Reductions and Removals

Assessment team checked the baseline, project and leakage calculation and confirm that the evaluation of baseline, project and leakage is as per the approved methodology and formula used to calculate the same is correct. The detail analysis is as below:

Baseline Emission:

As per the approved consolidated Methodology ACM0002 version 19.0:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired 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:

$$\mathbf{BE_y = EG_{PJ,y} \times EF_{grid,CM,y}}$$

Where:

BE_y = Baseline emissions in year y (tCO_2/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 CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 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" (tCO_2/MWh)

The grid emission factor is calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values. The value of combined margin is sourced from 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA. China DNA calculates the data based on Tool to Calculate the Emission Factor for an Electricity System", Version 07.0. No further assessment is required for grid emission calculation as the ex-ante value is sourced directly from the Chinese DNA.

Emission factor (EF_y):

$EF_y = EF_{grid,CM,y}$= 0.7674 tCO_2/MWh. This value is fixed ex-ante for the crediting period.

$EG_{PJ,y}$ is calculated based on capacity (Checked from the manufacturer specification), PLF= sourced from offer letter thus fulfilling the requirement of Para 3 (b), Annex 11 EB 48. Moreover, $EG_{PJ,y}$ is a monitoring parameter and the actual value will be obtained during the verification of the project activity.

$BE_y = 948,633.80 \times 0.7674 = 727,982\ tCO_2$

Project Emission:

As per the approved consolidated ACM0002 version 19.0: "For most renewable energy 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 as project emissions by using the following equation:

$$\mathbf{PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}}$$

Where:

PE_y = Project emissions in year y (tCO_2e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2/yr)

$PE_{GP,y}$ = Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (tCO_2e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

As the project activity is the installation of a new grid-connected Wind Power plant and does not involve any project emissions from fossil fuel, operation of dry, flash steam or binary geothermal power plants, and from water reservoirs of hydro power plants. Therefore $PE_{FF,y,}$ $PE_{GP,y}$, $PE_{HP,y}$ are equal to zero and thus, $PE_y = 0$.

Leakage Emission:

Leakage emission is not considered as per the requirement of ACM0002 version 19.0.

Net Emission reduction:

Reductions are calculated as follows:

$$ER_y = BE_y – PE_y$$

Where:

ER_y = Emission reductions in year *y* (t CO_2e/yr)

BE_y = Baseline emissions in year *y* (t CO_2/yr)

PE_y = Project emissions in year *y* (t CO_2e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$ER_y = BE_y – PE_y$

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
Year 1	727,982	0	0	727,982
Year 2	727,982	0	0	727,982
Year 3	727,982	0	0	727,982
Year 4	727,982	0	0	727,982
Year 5	727,982	0	0	727,982
Year 6	727,982	0	0	727,982
Year 7	727,982	0	0	727,982
Year 8	727,982	0	0	727,982
Year 9	727,982	0	0	727,982
Year 10	727,982	0	0	727,982
Total	**7,279,820**	0	0	**7,279,820**

3.3.7 Methodology Deviations

The assessment team confirms that no methodology deviation is applicable for the present project activity.

3.3.8 Monitoring Plan

Assessment team checked the monitoring practice onsite and also checked the guideline of respective State electricity regulatory commission. The detail analysis is as below:

Parameters determined ex-ante:

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor in year y
Source of data used:	2017 Baseline Emission Factors for Regional Power Grids in China dated

	20/12/2018 published by China DNA
Value applied:	0.3232

Data / Parameter:	**$EF_{grid,OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operating margin CO_2 emission factor in year y
Source of data used:	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
Value applied:	0.9155

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor in year y
Source of data used:	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
Value applied:	0.7674

As value of both parameters are sourced from 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA, by checking 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA, it is able to confirm correct value has been applied for both parameter and would be fixed through the first crediting period.

Parameters determined ex-post:

Following parameters will be monitored ex-post:

Parameters title	**Descriptions**
$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y

$EG_{facility,y}$:

$EG_{facility,y}$ is the difference of $EG_{export,y}$ and $EG_{import,y}$, the formula is below:

$EG_{facility,y} = EG_{export,y} - EG_{import,y}$

For $EG_{export,y}$ and $EG_{import,y}$:

Both parameters will be continuous measured and at least monthly recording by 2 sets of electricity meters installed on the transform substation. The accuracy of the meters is 0.2s and will be calibrated once a year by qualified organization according to national standard.

For $EG_{facility,y}$, the data of the parameter will be crosschecked with sales record.

It is reported that the data will be kept for 2 years following the end of the crediting period or till the last issuance of VERs for the project activity whichever occurs later.

The responsibilities and authorities of project management, data handling and recording, measurement methods and QA/QC procedure have been systematically established and formalized and the same was verified during the site visit.

The assessment team confirms that the monitoring plan contains all necessary parameters which have been clearly described in Joint PD & MR and that the means of monitoring described in the plan complies with the requirements of the methodology.

3.4 Non-Permanence Risk Analysis

Not applicable for the present project activity.

4 SAFEGUARDS

4.1 No Net Harm

The project activity promotes environmental and socio-economic well-being as it results in zero GHG emissions due to installation and operation of clean, renewable energy technology for electricity generation.

By checking Environmental Impact Assessment (EIA) Report for the proposed project compiled by Ningxia Dingxing Consulting company also approved by Environmental Protection Bureau of Ningxia Hui Autonomous Region on 05/07/2015, the assessment team confirm all environmental impacts has been analysed and no net harm was detected.

4.2 Environmental Impact

By checking Environmental Impact Assessment (EIA) Report compiled by Ningxia Dingxing Consulting company, the environmental impact for both construction and operation phase have been presented below:

Construction Phase:

Ecological Impact

Because the impeller of the wind turbine of the proposed project is 121 m, the flight height of the bird migration is usually lower 1,000 m, and to the small birds the flight height is less than 300 m based on the information. Therefore, the proposed project has little impact on the birds' migration.

Atmosphere Impact

The main air pollution sources during the construction period include off-gases from the operation of many kinds of machines. And the pollutant source is scattered with little emission. Thus, the construction will not cause much negative impact on the local air environment.

Wastewater Impact

The waste water from construction is mainly wastewater from the construction activity and the sewage from construction staff. The constriction waste water was mainly sediment waste water, with some measures to reduce the impact, including collecting, depositing etc., and then recycled to clean the construction sites. And the sewage from construction staff is mainly used to green and fall dust. So the wastewater will not have the impact on the local water environment.

Noise impact

During the construction period, the noise of the construction is between 84 dB and 105 dB, mainly including piling machine, loading shovel and other transport vehicles. Because of the proposed project site is located in the hill and there are few residents. Furthermore, the sensitive region is at a distance of 400 m away from the wind farm. According to relative standards, some steps are to be taken to reduce the noise impact. So, the noise impact has little impact on the project site.

Solid Waste Impact

The solid wastes in the construction period including the construction wastes and household garbage will be collected. The construction wastes will be treated on site and the household garbage will be moved to a designated site to be disposed properly. So, the solid wastes will not have the impact on the environment.

Operation Phase:

Ecological Impact

Due to the low noise of the wind turbines, the proposed project has no effect to the birds during the operation period. Because there are no residents and other radio communication facilities within the assessment range, the electromagnetic radiation of the proposed project has little impact on the surrounding environment.

Atmosphere Impact

During the operation period, the emission resources are mainly from the restaurant in the project site. Using the clean fuel and discharge after purification, there is no impact on the local atmosphere impact.

Wastewater Impact

The proposed project has the 1.0 m^3/d wastewater, which has been biochemical treatment, used to fall dust with surrounding areas. Hence, the waste water will not have the impact on the local water environment.

Noise impact

There is the noise of the wind turbines operation during the operation time. The nearest resident regions are 400m away from the wind farm, so the noise does not influence the residential districts nearest to the site.

Solid Waste Impact

After the project completed, the solid waste is mainly household garbage with the output 2.4 t/a, which should be airtight and stored in the control centre, then moved to the garbage collected site. And the waste oil of wind turbine is about 99 kg/a, which is the hazardous waste and should be recycled and disposed by the manufacturer when they have maintained the wind turbine based on the relative hazardous waste disposal regulation. So, the solid wastes will not have the impact on the environment.

Conclusion

After the above measures are performed, the negative impacts on environment will be minimized below the requirements of laws and regulations during the construction and operational period.

4.3 Local Stakeholder Consultation

As per the VCS requirements, it is necessary to invite the relevant stakeholders, prior of the validation process. Moreover, the stakeholder meeting took place on or near project site prior to the start date of the project activity which fulfill the requirement of project standard for project activities version 02. The assessment team checked the relevance of the dates during the validation site visit. The detail of the invitation date and stakeholder meeting date is as below:

The first stage

The public participation was organized in Nov 2016 for collecting stakeholder's views and opinions mainly focused on the environmental impacts through releasing questionnaire and public announcement, partly by interview one by one:

Medium bulletin: make medium bulletin in the local residential area near the location site and release bulletin survey of stakeholders in the residential area near the project construction site. The bulletin contents include general description of the proposed project, public participation load table and contact method.

Questionnaire survey: The survey objects include local government and related departments of Xiangshan County, the local villagers living nearby the project activity. During the survey of stakeholders, 150 questionnaires were released, and 145 questionnaires were got back, the return ratio is 96.7%. In addition, 40 people is interviewed and consulted.

The second stage

To know the public's suggestions and advices mainly on the issues of VCS application of the proposed project, the project owner did the stakeholders' survey in Nov 2017. The survey range was in Xiangshan County, 46 questionnaires were released, and all were got back.

By checking the questionnaires, the assessment team confirm that the local stakeholder has no negative comments for the construction of the project activity.

Thus, the assessment team is of the opinion that the stakeholder meeting was adequate and appropriate.

4.4 Public Comments

Assessment team noted that this project was open for public comment from 08/03/2019 to 07/04/2019.

The detail was checked by the assessment team in the following web platform

https://www.vcsprojectdatabase.org/#/pipeline_details/PL1867

During the period, the project has received the comments as below:

"Table of financial parameters lists loan interest as parameter and the PDD say the parameters in the table were the "main input values for the investment analysis". The PDD doesn't show calculation of IRR so cannot tell if loan interest was actually used in the calculation of IRR. It is not allowed to be. "The cost of financing expenditures (loan repayments and interest) shall not be included in the calculation of project IRR" - CDM Investment Analysis Tool

Reply: The cost of financing expenditures is only used to calculate the taxable income. Without considering this part, the IRR will be even lower.

Benchmark IRR is cited from Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects, State Power Corporation, China Electric Power Press, 2003. This is 16 year old reference and is unclear whether this source is still relevant and was used in the investment decision (38.d of additionality tool).

Reply: Yes, Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects, State Power Corporation, China Electric Power Press, 2003 is still widely used in China.

Annual power supply value used in the investment analysis is 101,243MWh/y. The project details in the PDD say "The expected annual power delivered to the grid is 1,012,432.5 MWh".

Reply: This is a mistake which has been corrected, the electricity delivered to the grid is 948,633.80 MWh.

How worker annual salary contributes to investment analysis not known. Lists annual worker salary and 200 employees. 200 employees being claimed for initial startup (construction) or carried annually? 200 probably is not correct especially for annually. The Feasibility Study Report should be made available because it is the only source of these investment parameters.

Reply: The number of employees during construction period is 200, and that during operation period is 65. The correctness of 65 employees has been justified in the report. The FSR is available for the DOE.

The project is in Ningxia Hui Autonomous Region which is category IV resource zone. Category IV resource zone has had a feed-in tariff of RMB 0.57 per kwh made effective 2017. PDD says that the tariff 0.42 RMB/kWh (Excluding VAT) of the proposed project has been used in FSR and PDD is the latest available tariff. PDD also cites CDM document using 2004 data to claim highest FIT in this area is .53. What is the actual FIT they will received? .57? Would they have known that when the (non public) Feasibility study report was written?"

Reply: According to "Notice about completing the on-grid power tariff with the wind power generation from NDRC of China", FaGaiJiaGe [2015] No.3044 dated 22/12/2015, Ningxia Hui Autonomous Region is category III other than IV resource zone. The tariff for wind power projects located in Ningxia Hui Autonomous Region which belong to III wind resource region is 0.54 RMB/kWh (incl. VAT) according to the notification. The FSR of the project activity was completed on January 2017 and approved on 07/01/2017. Then this notification should be applicable for the project activity. The highest tariff of the registered CDM projects in this area is 0.58 RMB/kwh. Even if the highest tariff is applied in the project, the IRR is still below benchmark.

All these comments or issues raised have been addressed during the validation and verification process, please refer to the respective content above for more detail. However, a simple explanation is provided below the comments for a quick check.

5 VERIFICATION FINDINGS

5.1 Accuracy of GHG Emission Reduction and Removal Calculations

The monitoring has been carried out in accordance with the monitoring plan contained in the Joint VCS PD & MR. All parameters were monitored and determined as per the monitoring plan which is listed in below table:

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Purpose of the data:	Calculation of baseline emissions
Parameter value:	2,001,008.63
Source of data used:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y ($EG_{facility,y}$) is calculated by following formula: $EG_{facility,y} = EG_{export,y} - EG_{import,y}$ For $EG_{export,y}$ and $EG_{import,y}$ are sourced from Meter Reading Record (MRRs) issued by the project owner, Electricity Transaction Notes (ETNs) issued by power grid company covering monitoring period.
Information flow:	For $EG_{export,y}$ 2 sets of bidirectional electricity meters installed on the transform substation was measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner and power grid company will record electricity meter's readings and form Meter Reading Records (MRRs). The staff from power grid company will then transcribes the data into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the project owner will issue the invoice. For $EG_{import,y}$ 2 sets of bidirectional electricity meters installed on the transform substation was measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner and power grid company will record electricity meter's readings and form Meter Reading Records (MRRs). The staff from power grid company will then transcribes the data into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the power grid company will issue the invoice. The data for MRRs, ETNs have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 2 sets of bi-direction electricity meters. See below for the information of 2 sets of bi-direction electricity meters verified by site visit and checking calibration

<table>
<tr><td></td><td>certificates:
<table>
<tr><th>Meter</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr>
<tr><td>M522 (Main meter)</td><td>DSSD8848</td><td>080002009870</td><td>0.2s</td></tr>
<tr><td>M523 (Backup meter)</td><td>DSSD8848</td><td>080002009875</td><td>0.2s</td></tr>
<tr><td>M533 (Main meter)</td><td>DSSD8848</td><td>080002009822</td><td>0.2s</td></tr>
<tr><td>M534 (Backup meter)</td><td>DSSD8848</td><td>080002009872</td><td>0.2s</td></tr>
</table>
The type, serial number and accuracy have been confirmed by site visit.</td></tr>
<tr><td>Calibration:</td><td>The calibration information is shown as below:
<table>
<tr><th>Meter</th><th>Calibration date</th><th>Valid until</th></tr>
<tr><td rowspan="3">M522 (Main meter)</td><td>28/01/2017</td><td>27/01/2018</td></tr>
<tr><td>05/04/2017</td><td>04/04/2018</td></tr>
<tr><td>03/04/2018</td><td>02/04/2019</td></tr>
<tr><td rowspan="3">M523 (Backup meter)</td><td>28/01/2017</td><td>27/01/2018</td></tr>
<tr><td>05/04/2017</td><td>04/04/2018</td></tr>
<tr><td>03/04/2018</td><td>02/04/2019</td></tr>
<tr><td rowspan="3">M533 (Main meter)</td><td>28/01/2017</td><td>27/01/2018</td></tr>
<tr><td>05/04/2017</td><td>04/04/2018</td></tr>
<tr><td>03/04/2018</td><td>02/04/2019</td></tr>
<tr><td rowspan="3">M534 (Backup meter)</td><td>28/01/2017</td><td>27/01/2018</td></tr>
<tr><td>05/04/2017</td><td>04/04/2018</td></tr>
<tr><td>03/04/2018</td><td>02/04/2019</td></tr>
</table>
The calibration was conducted by accredited third party which is Measurement Center of Ningxia Electric Power Company of State Grid was accredited by Ningxia Hui Autonomous Regional Administration of Quality and Technical Supervision.</td></tr>
<tr><td>QA/QC procedure:</td><td>Readings taken from the meters and recorded in the monthly monitoring report are cross checked with electricity sales receipts.
Data record will be archived for a period of 2 years after the crediting period to which the records pertain.</td></tr>
<tr><td>Means of verification:</td><td>Data of the parameter was verified by checking MRRs and ETNs. All data is in line with MRRs and ETNs;
Information flow was verified by checking MRRs and ETNs, and all information are consistent;
Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PDD;
Calibration was verified by checking calibration certificate and Accreditation certificate, all calibration of monitoring equipment meets the requirement indicated in the PDD.</td></tr>
</table>

Parameters available at validation stage:

Below data has been verified against the data sources and the Joint VCS PD & MR:

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor in year y
Source of data used:	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
Value applied:	0.3232

Data / Parameter:	**$EF_{grid,OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operating margin CO_2 emission factor in year y
Source of data used:	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
Value applied:	0.9155

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor in year y
Source of data used:	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
Value applied:	0.7674

The assessment team confirm both data of parameters are consistent with 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA.

5.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

The monitoring has been carried out in accordance with the monitoring plan contained Joint VCS PD & MR.

As a result of verification of the ER calculation process, the assessment team confirmed that all the parameters required for the determination of the emission reductions have been included in the MR Report and ER Calculation Spreadsheet and are consistent with the applied methodology ACM0002 version 19.0 and the monitoring plan contained in Joint VCS PD & MR. The parameters are complete in this monitoring period.

After verifying the reported figures with the raw data sources, it's confirmed that the values of the parameters from the raw data sources are consistent with those quoted in the ER Calculation Spreadsheet and the MR Report. The verification process for the same has been clearly described above in section 4.1 of the report.

By comparing the actual ER claimed in this monitoring period with the estimate in Joint VCS PD & MR, the actual emission reductions (1,535,574 tCO_2e) are 7.53% higher than what is stated in the registered

PD (i.e. 1,428,041 tCO_2e, equals to annual emission reductions, 727,982 tCO_2e multiplied by the actual operational days 716 days then divided by 365 days) which are consider in the reasonable variation range. Moreover, when considering actual annual electricity generation in this monitoring period in the financial analysis, the IRR of the project is still under the benchmark. Therefore, the assessment team confirm the increasing of actual annual electricity generation will not lead to the overestimation of VERs.

6 VALIDATION AND VERIFICATION CONCLUSION

Applus+ Certification has been engaged by **Beijing Ruifang Information Technology Co., Ltd** to perform the Joint validation and verification of the "Ningxia Xiangshan Wind Farm Project"

The management of the project proponent/owner is responsible for the preparation of the GHG emissions data and the reported/estimated GHG emissions reductions on the basis set out within the project's Monitoring Plan in the Joint VCS PD & MR and the approved methodology ACM0002 version 19.0.

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

- The projects description compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7

- The project's baseline and additionality is assessed against "ACM0002 version 19.0 for large scale project

- The project's monitoring plan is assessed against "ACM0002 version 19.0 for large scale project

- A risk based approach has been followed to perform this validation activity. The review of the project description and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews with Project Owner have provided LGAI Technological Center S.A. (Applus+ Certification) with sufficient evidence for positive validation opinion as per the requirement of VCS.

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

- the project is operated as planned and described in the project document;

- the monitoring plan is as per the applied methodology;

- the monitoring process in Monitoring Report is as per the PD

- the development and maintenance of records and reporting procedures are in accordance with the monitoring plan;

- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.
- No limitation observed for the present verification

Verification period: 15/04/2017 to 28/02/2019 (first and last date included)

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

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
15/04/2017 to 31/12/2017	529,532	0	0	529,532
01/01/2018 to 31/12/2018	844,399	0	0	844,399
01/01/2019 to 28/02/2019	161,641	0	0	161,641
Total	**1,535,574**	**0**	**0**	**1,535,574**

APPENDIX 1: REFERENCE LIST

1. Joint VCS PD & MR, version 1.0, dated 01/03/2019; version 2.0, dated 07/04/2019
2. Estimated ER calculation spreadsheet
3 Actual ER calculation spreadsheet
4 IRR calculation spreadsheet
5. VCS standard version 3.7, dated on 21/06/2017
6. Approved methodology ACM0002, version 19.0, dated 31/08/2018
7. Tool to calculate the emission factor for an electricity system, version 07.0
8. CDM Validation and Verification Standard for project activities version 02
9. CDM Project Standard for project activities version 02
10. CDM project cycle procedure for project activities version 02
11. Construction Order
12. Operation Log
13. Nameplate of the equipment
14. FSR
15. Project Approval
16. EIA
17. EIA Approval
18. Business License
19. 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018
20. Tool for the demonstration and assessment of additionality, version 07.0.0
21. Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects public by China Electric Power Press dated March 2003
22. Final Accounting Report
23. Purchase contract of Wind turbines

24. Notice about completing the on-grid power tariff with the wind power generation from NDRC of China, FaGaiJiaGe [2015] No.3044 dated 22/12/2015

25. Construction Standard for Wind farm project

26. China Statistical Yearbook 2018

27. Budget Estimation Method and Calculation Standard on the Design of Feasibility Study Report of Wind Farm Project

28. Ministry of Finance and the State Administration of Taxation: Notice about VAT Policy of China (CaiShui [2008] No. 170)

29. Interim Regulations of the People's Republic of China on Value Added Tax (No. 538)

30. Notice of the about Policies regarding the Value Added Tax on Products Made through Comprehensive Utilization of Resources and Other Products (CaiShui [2008] No. 156)

31. Income Tax Law of the Peoples Republic of China for Enterprises

32. Interim Rules on Additional Tax for City Development, GuoFa[1985] No.19

33. Provisional Regulations of the People's Republic of China on Education tax

34. Investment Analysis, version 09.0

35. China Wind Farm Installed Capacity 2013, 2014, 2015, 2016 and 2017

36. Questionnaires for stakeholder meeting

37. Meter Reading Record (MRRs) for Meters covering the monitoring period

38. CDM Monitoring procedure

39. Calibration Certificates for electricity meters covering the monitoring period

40. Accreditation Certification for Measurement Center of Ningxia Electric Power Company of State Grid was accredited by Ningxia Hui Autonomous Regional Administration of Quality and Technical Supervision

41. Electricity Transaction Notes (ETNs) for Meters covering the monitoring period

42 Loan contract

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

CAR ID	01	**Section no.**	3.3.5	**Date:** 15/03/2019
Description of CAR				
The value used for IRR calculation is not consistent with the value in the FSR.				
Project proponent response				**Date:** 07/04/2019
The value used for IRR calculation is revised to be consistent with the value in the FSR.				
Documentation provided by project proponent				
Updated IRR				
DOE assessment				**Date:** 07/04/2019
By checking updated IRR, it is confirmed that the value used for IRR calculation is in line with the FSR.				

CAR ID	02	**Section no.**	5.1	**Date:** 15/03/2019
Description of CAR				
The monitoring plan is not in line with the requirement of ACM0002.				
Project proponent response				**Date:** 07/04/2019
The monitoring plan is revised to be in line with the requirement of ACM0002.				
Documentation provided by project proponent				
Updated Joint VCS PD & MR				
DOE assessment				**Date:** 07/04/2019
By checking updated Joint VCS PD & MR, it is confirmed that the monitoring plan is now in line with the requirement of ACM0002, version 19.0				

APPENDIX 3: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERSSHORT CVS OF THE TEAM:

Hanshen (Denny) Xue (Master Degree in Environmental Engineering, Bachelor Degree in Thermal Engineering) is a lead auditor appointed by Applus+ Certification for the GHG project assessment. He is based on Shanghai. He has 1.5 years of work experiences in CDM project development. Before he joined Applus+ Certification, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

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

APPENDIX 4: ABBREVIATIONS

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
AM	Approved Methodology
AMS	Approved Methodology Small Scale
Applus+ Certification	LGAI Technological Center, S.A. (Applus)
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
IRR	Internal Rate of Return
KP	Kyoto Protocol
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-Governmental Organization
OM	Operational Margin
PDD	Project Design Document
PP	Project Proponent
UNFCCC	United Nations Framework Convention for Climate Change
VVS	Validation and Verification Standard