

**SECTION D. Application of a monitoring methodology and plan****D.1. Name and reference of approved monitoring methodology applied to the project activity:**

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The project participants propose to use the approved consolidated monitoring methodology ACM0002 (Version 06) entitled “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, which has to be used in conjunction with the ACM0002 baseline methodology.

**D.2. Justification of the choice of the methodology and why it is applicable to the project activity:**

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This monitoring methodology is to be used in conjunction with the chosen baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”. Application of the approved monitoring methodology ACM0002 to the proposed project is justified because:

- the approved baseline methodology ACM0002 is used;
- the project activity is connected to the grid;
- the electricity is generated using wind sources;
- it is not a fuel switching project; and
- the boundary of the grid to which the Wind Farm Project is connected is clearly identifiable as the North China Power Grid and the information on the characteristics of the grid is available.



D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

In accordance with the ACM0002 baseline methodology, the project participants have chosen to use data based on ex-ante monitoring, using the best data available at the time of submission of the PDD.

**D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:**

ID number (Please use numbers to ease cross-referencing to D.3)	Data type	Data variable	Data unit	Measured (m), calculated I or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

The proposed project is a zero-emission electricity generating activity; therefore no emissions from the project activity were identified.

**D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO<sub>2</sub> equ.)**

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Project emissions: PE<sub>y</sub>=0.

**D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary**

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and how such data will be collected and archived :										
ID number	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	For which baseline method(s) must this element be included	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment
1E <sub>total</sub>	Electricity quantity	The total net electricity supplied to the grid	MWh	m		Continuously measurement and monthly recording	100%	Electronic	During the crediting period and two years after	
2E <sub>manjing</sub>	Electricity quantity	The net electricity exported from Manjing project	MWh	m		Continuously measurement and monthly recording	100%	Electronic	During the crediting period and two years after	
3E <sub>manjing east</sub>	Electricity quantity	The net electricity exported from Manjing east project	MWh	m		Continuously measurement and monthly recording	100%	Electronic	During the crediting period and two years after	

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<u>4E<sub>back-up</sub></u>	<u>Electricity quantity</u>	<u>The electricity consumption from the 10KV back-up line</u>	<u>MWh</u>	<u>m</u>		<u>Continuously measurement and monthly recording</u>	<u>100%</u>	<u>Electronic</u>	<u>During the crediting period and two years after</u>	
<u>5EG<sub>manjing east</sub></u>	<u>Electricity quantity</u>	<u>The calculated net electricity from manjing east project</u>	<u>MWh</u>	<u>c</u>		<u>monthly</u>	<u>100%</u>	<u>Electronic</u>	<u>During the crediting period and two years after</u>	

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**D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO<sub>2</sub> equ.)**

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The project activity now shares the 110kV power line to the substation of the grid and the electricity meter installed there with Manjing project. The Baseline Emissions ( $BE_y$ , in t CO<sub>2</sub>), for each year y, are calculated by multiplying the baseline emissions factor ( $EF_y$ , in tCO<sub>2</sub>/MWh) by the calculated net electricity from manjing east project ( $EG_{manjing east}$ , in MWh), as follows:

$$EG_{manjing east} = EG_{total} * E_{manjing east} / [E_{manjing east} + E_{manjing}] - E_{back-up}$$

$$BE_y = EG_{manjing east} * EF_y$$

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With the baseline emissions factor ( $EF_y$ ) calculated using operating and build margins as described in detail in section B.2 and following ACM0002 with the following formulae:

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}}$$

$$EF_{BM} = \sum_i S_i \cdot C_{EFi}$$

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$$

The weight for operating and build margin emission factors by default is:  $w_{OM}=0.75$ ,  $w_{BM}=0.25$ . The operating margin is calculated using the weighted average of generation in most recent data-obtainable three years in North China Power Grid. The build margin is calculated from publicly available statistics using more than 20% most recently added capacity following the procedure as explained in section B.2.

**D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).**

**D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:**

ID number	Data type	Data variable	Data unit	Measured (m), calculated I, estimated (e),	For which baseline method must this element be included	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment

Not applicable.

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**D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO<sub>2</sub> equ.):**

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Not applicable.

**D.2.3. Treatment of leakage in the monitoring plan**

**D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity**

ID number <i>(Please use numbers to ease cross-referencing to table D.3)</i>	Data variable	Source of data	Data unit	Measured (m), calculated I or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment

According to ACM0002, no leakage is needed to consider.

**D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO<sub>2</sub> equ.)**

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Not applicable as no sources of leakage have been identified.

**D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO<sub>2</sub> equ.)**

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The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reductions  $ER_y$  by the project activity during a given year  $y$  is the difference between baseline emissions ( $BE_y$ ), project emissions ( $PE_y$ ) and emissions due to leakage ( $L_y$ ), as follows:

$$ER_y = BE_y - PE_y - L_y$$

With  $PE_y$  and  $L_y$  being zero as indicated estimated emission reductions can be calculated using the formula for calculating the baseline emissions ( $BE_y$ ). The Baseline Emissions are calculated by multiplying the baseline emissions factor ( $EF_y$ ) by the calculated net electricity from manjing east project ( $EG_{manjing\ east}$ ), as follows:

$$ER_y = BE_y = EG_{manjing\ east} \cdot EF_y$$

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With the baseline emissions factor ( $EF_y$ ) calculated using operating and build margins as described in detail in section B.2.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
D.2.1.3.-1.	Low	These data will be directly used for calculation of emission reductions. The data are double-checked against commercial data. The meter for monitoring and validation will be used for electricity sales to the grid.

#### D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

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Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with Guohua (Hebei) Renewable Energy Co., Ltd.

Guohua (Hebei) Renewable Energy Co., Ltd. will establish CDM project management office and assign dedicated people responsible for the monitoring and report the emission reduction due to the project activity.

The output from Shangyi Manjing East Project is monitored and recorded using 4 meters. These meters are used for both CDM purposes and sales of the electricity generated to the grid company.

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The monitoring plan is presented in Annex 4.

**D.5 Name of person/entity determining the monitoring methodology:**

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- Mr. Shi Xiangfeng, Ms. Qian Yiwen, Mr. Liu Jinze, Mr. Zhang Wenbo, sxf@carbonresource.com. Carbon Resource Management China Representative Office, Suite 1310, Air China Plaza, No 36 Xiaoyun Lu, Chaoyang District, Beijing, China, 100027, Tel: +86 10 844 75246/8.
- Mr. Christiaan Vrolijk, cv@carbonresource.com. Carbon Resource Management Limited, Grove House, Lutyens Close, Chineham, Hampshire, RG24 8AG, UK, Tel: +44 1256 392700.
- Mr. Ji Deqiang, guohuawe@126.com. Guohua Energy Co., Ltd. No.52 Jiaoda East Road, Haidian District, Beijing, China, 100044, Tel: +86 10 62272612.



## Annex 4

### MONITORING PLAN

#### 1. Introduction

The Shangyi Manjing East Windfarm Project adopts the Revision to the approved consolidated monitoring methodology ACM0002 “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources” to determine the emission reductions from the net electricity generation from the windfarm. This revised plan describes in more detail the process as set out in Section D of the Project Design Document.

This revision is necessary to account for the fact that the project activity now shares the 110kV power line to the substation of the grid and the electricity meter installed there, with Manjing project as shown in the diagram below. Electricity generated by both wind farms is firstly stepped up within each wind farm respectively and then transmitted through the shared 110KV transmission line to the Zhangbei substation.

#### 2. Responsibility

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with Guohua (Hebei) Renewable Energy Co., Ltd.

Mr. Yu Jianguo, the Assistant General Manager of Guohua (Hebei) Renewable Energy Co., Ltd, is responsible for the monitoring and reporting of the windfarm. Guohua (Hebei) Renewable Energy Co., Ltd., in co-operation with the North China Power Grid Company, and existing windfarms experienced experts, and with the help of DOE, will train the staff carrying out the monitoring work.

#### 3. Installation of meters

The net electricity supplied from all the projects will be monitored through the use of metering equipment (main meter) at the substation of power grid. This main meter has two-way metering, recording both export to the grid ( $E_{s_{total}}$ ) and import from the grid ( $E_{i_{total}}$ ); net electricity supply ( $E_{G_{total}}$ ), therefore, is calculated as exports minus imports.

The main meter at the grid substation and the meters installed for each of the projects are indicated in the metering diagram below.

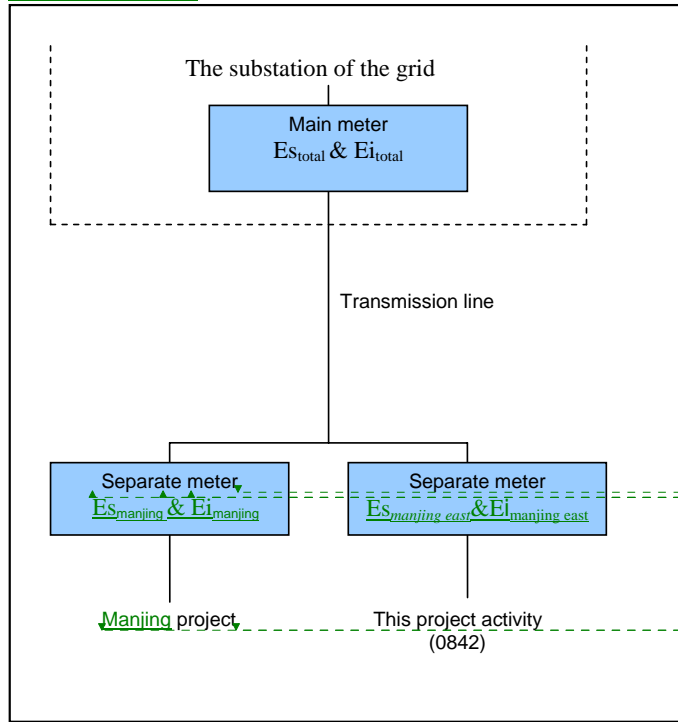
In addition, there exists a 10kV power line as a back up line, which is shared by the Hebei Shangyi Manjing East Wind Farm Project and the Manjing project. Electricity consumed through this backup line can be measured by a meter. This backup line is used only in emergency.

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The net electricity generation will base on the main meter installed in Zhangbei substation, and the backup meter in Shangyi Manjing East Windfarm is an assistant one. Both the main metering system equipment and the backup metering system equipment will be owned, operated and maintained by North China Power Grid.

Both meters will have the capability to be read remotely through a communication line. Both North China Power Grid and Shangyi Manjing East Windfarm have the right to read either meter.

Metering diagram

Based on the agreement between the project owner and the grid company, the separate meters for each wind farm are used to calculate each project's share of the total net electricity supplied to the grid. This means that any transmission losses are accounted for and are shared between the projects on the basis of net electricity exported to the transmission line. The net electricity supplied from the project activity ( $EG_{manjing\ east}$ ) can now be calculated as follows:

$$EG_{manjing\ east} = EG_{total} * E_{manjing\ east} / [E_{manjing\ east} + E_{manjing}] - E_{back-up}$$

Where:

$EG_{manjing\ east}$  is the calculated net electricity supplied from the project activity.

$EG_{total}$  is the total net electricity supplied to the grid at the substation of the grid which is calculated from the main meter; it is the difference between the reading of export to the grid ( $E_{s_{total}}$ ) and import from the grid ( $E_{i_{total}}$ ) measured by the main meter.

$E_{manjing\ east}$  is the net electricity exported from the project activity to the transmission line using the onsite separate meter for the Hebei Shangyi Manjing East Wind Farm Project. It is the difference between the exported electricity ( $E_{s_{manjing\ east}}$ ) and imported electricity ( $E_{i_{manjing\ east}}$ ) measured by the separate meter.

$E_{manjing}$  is the net electricity exported from Manjing project to the transmission line using the onsite separate meter for manjing project. It is the difference between the export to the line ( $E_{s_{manjing}}$ ) and import from the line ( $E_{i_{manjing}}$ ) measured by onsite separate meters.

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E<sub>back-up</sub> is the electricity consumption from the 10kV back-up power line by the project activity and Manjing project, and in order to be conservative the total consumption on the line (E<sub>back-up</sub>) is subtracted.

This approach is flexible to accommodate potential future installations of other projects which also share facilities with this project to increase the power transmission efficiency. All projects sharing the same facilities to the substation will be monitored.

**4. Calibration**

The metering equipment are calibrated and checked annually for accuracy so that the metering equipment shall have sufficient accuracy. The net generation output registered by the meters alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meters is within the agreed limits.

Calibration is carried out by North China Power Grid with the records being supplied to Shangyi Manjing East Windfarm, and these records will be maintained by Shangyi Manjing East Windfarm and the third party appointed by DOE.

All the meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

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All the meters installed shall be tested by North China Power Grid within 10 days after: the detection of a difference larger than the allowable error in the readings of both meters; the repair of all or part of meter caused by the failure of one or more parts to operate in accordance with the specifications.

If any errors are detected the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net generation output shall be determined by (a) first, by reading backup meter, unless a test by either party reveals it is inaccurate; (b) if the backup system is not with acceptable limits of accuracy or operation is performed improperly the Shangyi Manjing East Windfarm and North China Power Grid shall jointly prepare an reasonable and conservative estimate of the correct reading, and provide sufficient evidence that this estimation is reasonable and conservative when DOE undertakes verification; and (c) if North China Power Grid and Shangyi Manjing East Windfarm fail to agree then the matter will be referred for arbitration according to agreed procedures.

**5. Monitored data**

During the first seven operating years, all the relevant electricity data and the net electricity supplied to the grid will be monitored and recorded following the procedures above.

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**6. Quality control**

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Monthly net generation data will be approved and signed off by General Manger Mr. Zhu Tao before it is accepted and stored.

This audit will check compliance with operational procedures in this monitoring plan and Section D of the PDD.

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This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. If such improvements are proposed these will be reported to the DOE and only operationalised after approval from the DOE.

### 7. Data management system

Physical document such as paper-based maps, diagrams and environmental assessments will be collated in a central place, together with this monitoring plan. In order to facilitate auditors' reference of relevant literature relating to Shangyi Manjing East Windfarm project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of Shangyi Manjing East Windfarm and all the material will have a copy for backup.

And all data including calibration records is kept until 2 years after the end of the total crediting period of the CDM project.

### 8. Reporting

The steps required to meet the requirements for emissions reduction monitoring include:

- Zhangjiakou Electric Power Company reads main meter and reports the result to North China Power Grid Company monthly.
- Zhangjiakou Electric Power Company supplies reading to Shangyi Manjing East Windfarm monthly.
- Shangyi Manjing East Windfarm records readings from the ~~separate on-site meters~~ monthly.
- Shangyi Manjing East Windfarm carries out an internal audit on and reports the readings to the DOE 10 days before the verification is requested.

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### 9. Verification

Guohua (Hebei) Renewable Energy Co., Ltd. will facilitate the verification through providing the DOE with all required necessary information at any stage.